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VETERINARY MEDICINE

AUGUST 1939

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List of officers and meetings of A. V. M. A., with dates.
List of army veterinarians prior to 1916, with service record.
List of veterinary officers (2313) during the World War, with service record.
List of Veterinary Hospitals of the World War and their C. O.'s.
List of Division Veterinarians during the World War and their assignments.
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D. M. CAMPBELL, *Editor*
7632 S. Crandon Ave., Chicago, Ill.
Telephone South Shore 7160

H. J. MOSTYN, *Eastern Representative*
1265 Broadway, New York, N. Y.
Telephone Murray Hill 4-4037

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D. J. Davis, dean of the College of Medicine, University of Illinois, discovered Negri bodies in the same year that Negri announced his discovery of them.

* * * *

For that which befalleth the sons of men befalleth beasts; even one thing befalleth them: as the one dieth, so dieth the other; yea, they have all one breath.—*Ecclesiastes* 3:19.

* * * *

Five doctors are among the men who signed the Declaration of Independence: Joshua Bartlett and Matthew Thornton from New Hampshire, Oliver Wolcott from Connecticut, Lyman Hall from Georgia and Benjamin Rush from Pennsylvania.

* * * *

Vincent's angina, one of the most stubborn mouth and throat maladies and popularly known during the World War as "trench mouth," has been shown as a result of recent investigations to bear a close relationship to scurvy—vitamin C deficiency. There is every reason to believe that a lowered resistance of the gums and fauces due to vitamin C deficiency is conducive to the growth of the corkscrew-like spirochetes associated with the disease and that a diet containing adequate amounts of the citrus fruits is a good preventive.

The present average, annual net increase in physicians in the United States is 1,500. The largest increase in any one year (5,485) occurred in 1898. In 1921 the number decreased 385.

* * * *

After an extensive trial of pneumonia vaccine on CCC men, the U. S. Public Health Service announces that the incidence of pneumonia can be reduced at least one-half in a population group by vaccinating all members of the group.

* * * *

Dr. Gerhard Domagk, the German scientist who discovered the remarkable curative properties of prontosil for certain types of streptococcal infection, has been awarded the Cameron Medal by the University of Edinburgh (Scotland) for "a major contribution to practical therapeutics."

* * * *

March 1, 1939, the membership of the American Medical Association was 112,210. This represents an increase of 14,169 members in the past five years, an average yearly increase of more than 2,800 since March 1, 1934. This seems to be good evidence that the medical profession generally strongly supports the policies of the national organization, which have been continuously under fire of recent years.

The Tail Setting Controversy

The controversy over tail setting in saddle horses that has smoldered for a score of years has flamed spectacularly recently. Three occurrences are mainly responsible for the flare-up at this time—(1) an article and a series of illustrations on "The Fiendish Practice of Breaking Horses' Tails for Style" in *Pic*, a sensational photo-magazine, (2) a $2,000 stake for 3-gaited saddle horses with natural tails at the New York National horse show and (3) an announced intention by the president of the American Humane Association to endeavor to have enforced the statutes in New York, New Jersey, Massachusetts and Connecticut prohibiting the showing of horses that have had their tails set.

Tail setting is opposed on the grounds that: (1) it is silly, which of course it is, but it seems likewise to single it out for discrimination from among a million other silly things, e.g. women's hats, (2) it hinders breeding for high tail carriage in the saddle horse, which is undeniable but an affair solely of the saddle horse fraternity and (3) it constitutes cruelty to the animal.

The proponents of tail setting deny that the operation is painful when it is properly done or that it lessens the usefulness of the tail as a defense against flies when it is properly set, and support their position with impressive evidence. But their well-planned defense structure topples because of its rotten foundation when a writer in *The National Horseman* observes:

> Nine out of every ten tails that are set up are done by trainers and stable hands. These operations, many times, are not performed under sanitary conditions or in a humane way, by applying a local anesthetic. A great deal of this work is done by men who have had no training in veterinary surgery or the use of drugs. They just go ahead and do the job. Sometimes they hit. Sometimes they miss. I have seen horses with all kinds of scar tissue, showing that they have been operated or worked on many, many times.

The foregoing is so patent that to deny it is futile and none of the many contributors to the melée has yet done so. Thus if every argument of the proponents of tail setting be accepted at face value, 90 per cent of the time as practiced the operation is cruel, bunglesome butchery, akin to the surgery of the 16th century. The saddle horse industry has no one but itself to blame for its present predicament. If it refuses all that has been learned in surgery, in antisepsis and asepsis, and in anesthesia since the days of Paré, it should expect the condemnation of the more enlightened, and regulation not of its own choice.

* * * *

Salsbery Dies of Encephalomyelitis

Dr. Charles E. Salsbery, 57, vice-president of Jensen-Salsbery Laboratories, Kansas City, Mo., died July 7 from an infection with equine encephalomyelitis. Doctor Salsbery was in charge of the production of encephalomyelitis serum for his firm and it is assumed his was a laboratory infection.

C. E. Salsbery

Doctor Salsbery was graduated from the Kansas City Veterinary College in 1911 and was first employed as assistant to Dr. A. T. Kinsley in the pathology department of that institution. He left school work in 1914 to establish, with the late H. Jensen, the Jensen-Salsbery laboratories, which in time became one of the largest of the veterinary supply houses. From the first Doctor Salsbery had charge of the production of biological products, including anti-hog cholera serum.

Of recent years Doctor Salsbery has been in great demand for the discussion of a variety of subjects at veterinary meetings from coast to coast, and has contributed to the programs of a large number of veterinary meetings. His school work, his large commercial experience, his activity in organized veterinary medicine and his engaging personality won for him a wide acquaintance and a great many friends in the veterinary profession, who will be shocked to learn of his untimely end, which came about literally "in line of duty."

The St. Louis Meeting of the American Medical Association

The St. Louis session of 1939 takes its place along with all the other recent annual sessions of the American Medical Association as setting a peak for medical assemblages. Foremost again among the features of the meetings was the Scientific Exhibit, pronounced by most of the physicians in attendance the greatest opportunity for concentrated graduate education available anywhere in the world. In each of the exhibit spaces scientists recognized for their accomplishments in various fields of investigation, teaching and practice demonstrated the highlights of their work. In many places visitors found it difficult to pass through the aisles because of the great numbers of physicians assembled to hear lectures and to see demonstrations. Simultaneously motion pictures were being used to reveal the actual application of new technics in medical care. Special exhibits devoted to the diagnosis and treatment of pneumonia, of diabetes and of fractures were especially useful because they were coöperative features which thoroughly digested the subjects with which they were concerned.—*Edt. J. A. M. A.*, 5-27-39.

The foregoing, the opening paragraph of Secretary Fishbein's account of the 90th meeting of the American Medical Association held in St. Louis May 15-19, offers material for considerable pondering by those who arrange programs for annual meetings of the A. V. M. A., for our veterinary research institutions, the federal and state veterinary research institutions and the scientific departments of veterinary supply houses.

What corresponds to the scientific exhibit at A. M. A. meetings is termed the Educational Exhibit at A. V. M. A. meetings. It has never received anything approaching the attention its potential importance deserves. Until the 1933 A. V. M. A. meeting in Chicago, exhibits, other than commercial, at our annual meetings appear not to have been thought of. At that meeting the committee on local arrangements made an earnest endeavor to provide an educational exhibit. It is rather astonishing that although all the veterinary schools and the agricultural experiment stations doing the more outstanding veterinary research were invited to participate, none of the schools and none of the public research institutions other than the Bureau of Animal Industry of the U. S. Department of Agriculture did so, nor has the status of the exhibit been improved at meetings since Chicago. It develops that the name Educational Exhibit was happily chosen, since it appears that those who must furnish the exhibit must first be educated as to its importance.

It is regrettable that more veterinarians do not attend A. M. A. meetings. The demonstration A. M. A. meetings afford on how to so manage a scientific convention that those who attend may benefit most, would result in a material improvement of our own meetings. The foregoing instance of a feature that is rated as attaining the climax in educational value at A. M. A. meetings being badly neglected at A. V. M. A. meetings is but one of a considerable number of instances that might be cited of lost opportunities. A. V. M. A. conventions are good meetings and well worth attending, but they can be made better.

* * * *

It generally takes a long time and much mental effort to reach conclusions which, after reaching, seem so obvious that we wonder why there was ever any hesitation. —*K. T. Compton.*

* * * *

London Conference on Vitamin E

At a recent conference on vitamin E arranged by the Society of Chemical Industry (London, England), the discussion was opened by Dr. P. Vogt-Müller of Copenhagen, who stated that wheat germ oil gave 75% of success in the treatment of barren cows and 70% in barren sows. In human medicine vitamin E is successful in 70% to 80% of cases of habitual abortion. The treatment had also been effective in cases of threatened abortion. Dr. E. V. Shute of the University of Western Ontario said that a deficiency of vitamin E may be detected by a test of the vitamin E equilibrium of the blood.—*Jnl. Amer. Med. Assn.*

Memphis Meeting of the A. V. M. A.

BESIDES the glamor of the old South which still clings to Memphis with the fragrance and beauty of its magnolia blossoms, the city has many beauty spots in a more modern tradition. Among these are the "Pink Palace" and the Brooks Memorial Art Gallery.

The "Pink Palace", so called from the pink Georgia marble used in its construction, houses the Museum of Art and Natural History. Formerly the palatial home of a millionaire grocer, it is located in the center of a 135-acre section known as Chickasaw Gardens.

In the museum a vast collection of subjects of industrial art and natural history are displayed. Here are Indian relics taken from the ceremonial mounds in DeSoto Park, side by side with models of the steamboats that once plodded their way along the Mississippi River, and many old Southern relics in true Southern settings, including letters, firearms, and documents from the period of the War Between the States.

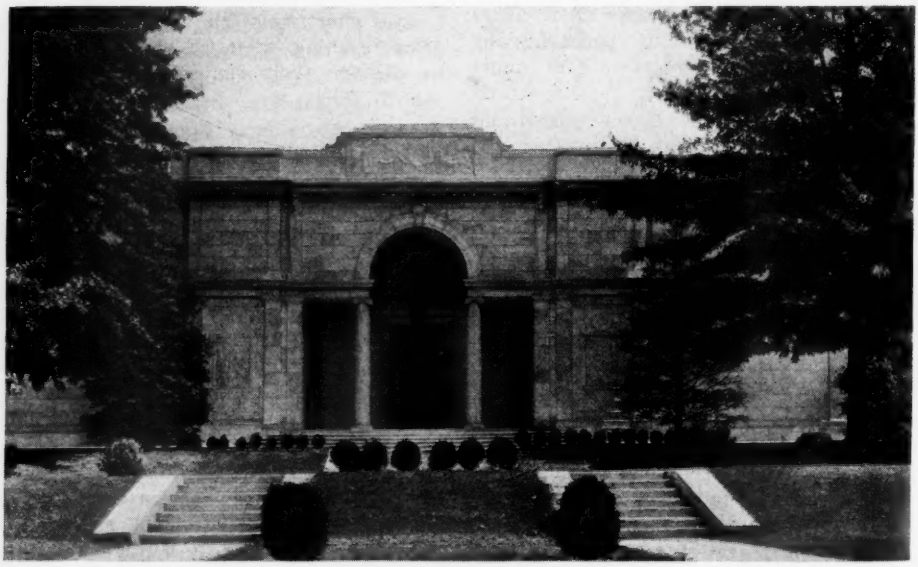
The Brooks Memorial Art Gallery was given to the citizens of Memphis in 1916 by Mrs. Bessie Vance Brooks, in memory of her husband, Samuel H. Brooks. Built of Georgian marble in a classical style, it is beautifully situated in Overton Park on a site donated by the Memphis Park Commission after its selection by Mrs. Brooks and her architect, James Gamble Rogers.

The gallery is under the direct jurisdiction of the Memphis Park Commission. It is a municipal institution, open without charge on week days from 9:00 a. m. to 5:00 p. m., and on Sundays from 2:00 to 5:00 p. m.

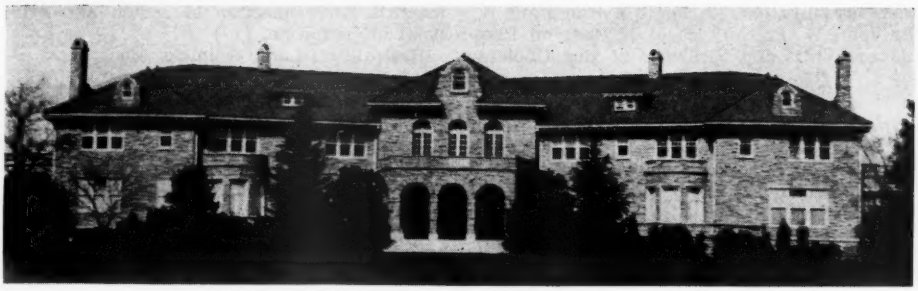
A small, but very fine collection of paintings is owned. Loan exhibitions of fine, applied, or commercial art are presented monthly.

The average monthly attendance at the gallery is four thousand.

These two cultural centers will perhaps have more appeal for the wives of veterinarians attending the 76th Convention of the A. V. M. A. in Memphis Aug. 28-Sept. 1,



The Brooks Memorial Art Gallery



The "Pink Palace"

than for the veterinarians themselves; but for those interested in historical relics and in art, as well as for those who merely want to keep cool on a hot afternoon, a trip to either museum, followed perhaps by a tall, cold mint julep, or something, will be well worth while—at any rate, the museums are worth while.

Literary Program

The program of the Memphis meeting includes:

Section on Research.—Gossypol Poisoning in Dogs, by John L. West; Streptococcic Infections in Dogs, by H. J. Stafseth; Canine Coccidiosis, by F. X. Gassner; Gastrointestinal Worm Parasitisms of Cattle, by D. W. Baker; Susceptibility of Guinea Pigs to Equine Encephalomyelitis, by Carl F. Schlotthauer; Influence of Various Ions on Intestinal Motility, by E. A. Hewitt; Losses in New-Born Pigs, by L. P. Doyle; Aerobic Flora of Pneumonic Lungs in Swine, by Frank Thorp, Jr., and F. W. Tanner; The Blood Picture of Hog Cholera, by H. C. H. Kernkamp; Red-Cell Sedimentation, by R. E. Nichols; The Chemistry of Horse Blood, by A. Henry Craige, Jr., and John D. Gadd; Brucella Vaccine, by A. Eichhorn, C. K. Mingle and F. M. Murdock; Hen's Egg as a Culture Medium for *Brucella Abortus*, by H. J. Metzger; Vaccination of Dogs with Modified Distemper Viruses, by R. G. Green and F. S. Swale.

Section on Sanitary Science and Food Hygiene.—Trends in Milk Sanitation, by Franklin A. Clark; Diagnosis of Rabies, by Joseph C. Willett; The M.S.C. Undulant Fever Epidemic, by I. Forest Huddleson; Bang's Disease and Its Control, by W. E. Cotton; Milk-Control Work, by M. O. Robinson; Trichinosis and Its Control, by L. E. Starr; Milk Producer, Inspector, and Laboratory Technician, by Frank E. Kitchen.

Section on General Practice.—Lameness Incident to Training and Racing, by J. E. Peters; Diseases of Fattening Lambs, by N. J. Miller; Mineral Deficiencies, by Hubert Schmidt; Hemorrhagic Septicemia, by W. A. Aitken; Anesthetics of Large Animals, by Geo. R. Fowler; Enteritis of Swine, by F. M. Wilson; Swamp Fever, by W. L. Gates; Mule Practice, by J. A. Goodwin; Pneumonia in the Horse, by D. L. Proctor; Intravenous Medication, by W. R. Krill; Diseases of New-Born Calves, by Fred Miller; Diseases in Feeder Cattle, by W. S. O'Neal; Diseases and Parasites in Garbage-Fed Hogs, by P. C. Guyselman.

Section on Small Animal Practice.—Hematology of Avitaminosis A in the Dog, by M. W. Emmel; Immunizing Potency of Antirabies Vaccines, by L. T. Webster; Vitamins and Vitamin Preparations in Small Animal Practice, by M. L. Morris and W. C. Russell; Blood Parasites of the Dog, by R. L. Mundhenk; Enteritis in Dogs, by Leonard W. Goss; Tumors of Small Animals, by Peter Olafson; Diseases of the Eye, by R. O. Rychener; Surgical Technic, by C. P. Zepp.

Section on Poultry.—Ruptured Yolks and Fowl Paralysis, by E. M. Moore; Duck Septicemia, by C. S. Gibbs; Misbranded Poultry Remedies, by H. E. Moskey; Fowl Typhoid in Turkey Poults, by E. P. Johnson and Morris Pollard; Pseudo-Tuberculosis Infection in the Blackbird, by F. R. Beaudette; Developing a Poultry Practice, by J. L. West.

Section on Research and Section on Poultry (Combined Session).—Preparturient Paresis in Ewes, by Hugh S. Cameron and H. Goss; Ketone Bodies, Sugar and Calcium in the Blood of Ewes, by Jesse Sampson, L. E. Boley, and Robert Graham; Composition of the Alveolar Air of Domestic Animals, by George T. Edds; Indoor Hen-Battery Mortality, by M. W. Emmel; Pullet and Hen Mortality, by L. E. Boley and Robert Graham; Avian Tumors, by L. J. Goss.

General Sessions.—Equine Encephalomyelitis, by H. W. Schoening; The Significance of Veterinary Medicine, by D. M. Campbell; Some

Nervous Disturbances Due to Avitaminosis B$_1$, by John W. Patton; Effect of Heat on Phenolized Virus and Virulence of Hog Cholera, by J. D. Ray.

Clinical Program

Horse and Mule Clinic.—Operations: Roarer; trephine with nerve blocking; monorchid castration; hyovertebrotomy; dental operations; fistulous withers; firing; quittor, and enucleation of the eye.

Demonstrations: Pregnancy test; nerve blocking, and sterility and artificial insemination.

Discussions: Skin diseases of large animals, and diseases of the eyes of horses.

Cattle Clinic.—Operations: Spaying of heifers; miscellaneous cattle operations; operation for self-sucking, and milk fistula.

Demonstrations: Sterility; diagnosis of mastitis, and collection of semen and artificial insemination.

Restraint of Large Animals: Mechanical restraint; anesthesia, local and general.

Sheep, Swine and Poultry Clinic.—Operation: Cesarian section (swine).

Demonstrations: Hog cholera; swine erysipelas; sheep; coccidiosis in poultry; tuberculosis in poultry, and laryngotracheitis in poultry.

Small Animal Clinic.—Operations: Tonsillectomy; hypertrophy of prostate; ossa bulla, and glaucoma.

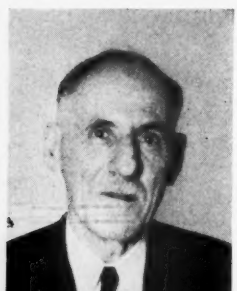
Demonstrations: Various anesthetics; various applications of splints; endoscopy, bronchoscopy and gastroscopy; side to side anastomosis; hernia; nerve and tendon suturing; castration by one-stitch method, and corneal transplant.

New Members of the Executive Board of the A. V. M. A.

Elections have just been held in two of the Executive Board districts of the American Veterinary Medical Association.

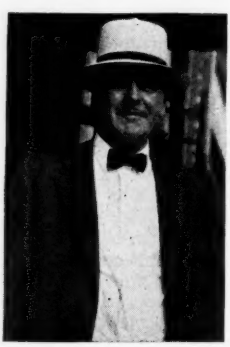
O. V. Brumley

In the fourth district, including Alabama, District of Columbia, Florida, Georgia, Kentucky, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, West Virginia, also Argentina, Bahamas, Bermuda, Chile, Cuba, Dominican Republic, Ecuador, Jamaica, Peru, Puerto Rico and St. Kitts, William E. Cotton of the Alabama Polytechnic Institute, Auburn, and formerly Superintendent of the Bureau of Animal Industry Experiment Station, Bethesda, Md., was elected for a five-year term.



W. E. Cotton

In the tenth district, including Michigan and Ohio, Dr. Oscar V. Brumley, dean of the College of Veterinary Medicine, Ohio State University, Columbus, and a former president of the A. V. M. A., was elected for a five-year period.



Herbert Lothe

In District No. 3, including Illinois, Indiana and Wisconsin, Dr. Herbert Lothe, practitioner of Waukesha, Wisconsin, was appointed by President Bergman to fill the unexpired term of L. A. Merillat, Chicago, who resigned upon accepting the position of executive-secretary of the A. V. M. A. The term to which Doctor Lothe was appointed expires in 1943.

Doctor Lothe becomes the only general practitioner on the Board and with Doctor Bower, a small animal practitioner, gives those engaged in practice—65% of the profession—two representatives among the 11 elected members of the Board. Doctor Lothe's skill in cattle practice has extended his reputation beyond the borders of his home state.

Species of Helminth Parasites of Domestic Animals in Texas*

By H. L. VAN VOLKENBERG, College Station, Texas
School of Veterinary Medicine,
Agricultural and Mechanical College of Texas

Helminths of the Dog

AMONG the tapeworms, *Dipylidium sexcoronatum* is found more frequently than *D. caninum*. *Tænia hydatigena* and *T. pisiformis* are common. *Multiceps serialis* is occasionally found. In one case (1938) the bladder worms of *M. serialis* removed from a jack rabbit almost filled a gallon jar. The rabbit harboring the cysts was found in a moribund condition near College Station. *Tænia ovis* was encountered in two dogs in 1938. Both were shepherd dogs brought to the clinic, treated, and several specimens of *T. ovis* were recovered from each animal. The specific identity was made by Dr. Allen McIntosh of the Bureau of Animal Industry, U. S. Department of Agriculture. The infestations undoubtedly originated in Wyoming. The bladder worm, *Cysticercus ovis*, is rarely if ever found in sheep in Texas.

Among the nematodes the tropical hookworm, *Ancylostoma braziliense*, is much less common than *A. caninum*, but specimens are readily found among collections of hookworms taken from dogs and cats. *Spirocerca sanguinolenta*, a nematode occurring in tumors in the esophagus, stomach and sometimes in the aorta, are fairly common. Unless adequate post-mortem examinations are made the tumors and worms may be overlooked.

Of the rarer helminths of the dog, a thorn-headed worm, *Oncicola canis*, is occasionally found in the small intestine. Recently a student recovered nine specimens of the worm from an embalmed carcass in the anatomy laboratory. With one exception (Nebraska) all the reported cases of this species, anywhere in the world, are from Texas dogs. The nine-banded armadillo is said to be the intermediate host. This armadillo, the only one in Texas, ranges between the Pecos and Mississippi rivers. It is also found in Arkansas and as far north as Oklahoma. *Oslerus osleri*, a small nematode found in tumors in the walls of the bronchi, trachea and occasionally in the lung tissue, has been reported by Price (1929) from College Station; one case in 1924 from a dog and one in 1925 from a coyote. The tongue worm or pentastome, *Linguatula serrata*, should be mentioned. This arthropod is worm-like, with a life history analogous to some of the helminths. One specimen, a female, was recovered from a dog in the clinic by Dr. A. A. Lenert in December, 1927. The history of the dog is not known. Apparently, inspectors are not finding the larvæ of this parasite in herbivores. In some parts of the South the larvæ are said to be fairly common in cattle.

In the College clinic the hookworm, heartworm and tapeworm are considered the most important parasites of the dog. The ascarids seem to be less common than in many localities. Several practitioners in the large cities of Texas regard the whipworm as an important parasite of the dog.

Helminths of Swine

The hydatid, *Echinococcus granulosis*, is the most common bladder worm found in swine. *Cysticercus tenuicollis* and the pork bladder worm, *C. cellulosæ* are occasionally found. Specimens of *C. cellulosæ* removed from several carcasses and examined by the writer were collected in Houston during 1938 and 1939 by Dr. E. G. Pigman. Doctor Pigman has presented the College with several museum specimens showing the cysts embedded in various tissues.

The red stomach worm, *Hyostrongylus rubidus*, is frequently found in swine. Of the

*Presented at a meeting of the Houston Veterinary Association May 4, 1939.

two species of thick stomach worms, only *Ascarops strongylina* has been found by the writer at College Station. This species is more common than the red stomach worm. The nodular worms are very common and it is not unusual to find massive infestations. Intact specimens of nodular worms are often seen in fresh feces. *Gongylonema pulchrum,* located in the esophagus, is fairly common. Doctor Pigman has presented the College with specimens showing the worm embedded in the tongue. *Trichinella spiralis* has not been found during 1938 and 1939 in the hogs slaughtered at the meat laboratory of the College. The diaphragms of the hogs are examined by the digestion-Baerman method.

Judging from post-mortem examinations, the most important parasites of swine in this part of Texas are the ascarid, the kidney worm, the lungworm, and the thorn-headed worm.

Helminths of the Horse

Tapeworms are of frequent occurrence in colts of a few months to 1½ years of age. This statement is based on findings made by fecal examinations. Most of the colts that are raised at College Station and the vicinity harbor tapeworms and, judging from the number of eggs passed, many are heavily infested. On the other hand, only 11 out of a total of 132 army horses stationed at College Station and examined recently were positive for tapeworm ova. The positive animals were passing only a comparatively small number of ova. Examinations of other mature horses showed an even lower percentage of infestation than was found in the army horses. These findings indicate that tapeworms similar to ascarids and some other worms of the horse are found principally in the young.

The species of tapeworm infesting these horses is not definitely known. Thus far, treatment to recover the tapeworms has not been available. The large tapeworm, *Anoplocephala magna,* has been found at least twice in horses at College Station. The rarity of reported cases of tapeworms in horses in this part of the country might suggest that the common species is the dwarf tapeworm, *Paranoplocephala mamillana.* The dwarf tapeworm is smaller in size than the other tapeworms of the horse and is less likely to be detected. It is possible that the animals which are passing ova are infested with either one or both of these species.

A third species, known as the perfoliate tapeworm, *A. perfoliata,* is said to be found occasionally in horses along the Gulf Coast. Although regarded as cosmopolitan, it is possible that this species is more or less limited in distribution to tropical and subtropical regions. It is rarely reported on this Continent and it is the only tapeworm enzoötic in the horse in Puerto Rico and the Virgin Islands.

The small stomach worm, *Trichostrongylus axei,* is very common and frequently occurs in heavy infestations. The large stomach worms, *Habronema* spp., are occasionally found. The threadworm, *Strongyloides westeri,* is very common in young colts of a few weeks of age. The colts seem to lose the bulk of the infestations without treatment, before reaching an age of six months. The pinworm, *Oxyuris equi,* is of infrequent occurrence.

The large and small strongyles in young and mature horses and the ascarids in colts are considered the most important internal parasites at the College clinic.

Helminths of Sheep and Cattle

An unusual enzoötic of measles in cattle occurred in 1938. Most of the animals included in three separate shipments from one ranch, on post-mortem inspection were found to be heavily infested with *Cysticercus bovis.* Upon investigation it was found that an attendant infested with the beef tapeworm had made a practice of defecating in a trough used for feeding cottonseed meal. The cattle ingesting the concentrate contaminated with the ova of *Tœnia saginata* became infested with the bladder worms.

The large liver fluke, *Fascioloides magna,* is of frequent occurrence in cattle of the Gulf Coast region. Usually only a few flukes

are found in fibrous cysts in the parenchyma of the liver. Because of the cysts and the black pigment associated with the fluke, the liver and often the tissues adjacent to the liver must be extirpated from meat carcasses.

Although the fluke is native to North America, it was first described by Bassi, an Italian, in 1875. The infestation apparently originated from an importation of American elk into a zoölogical park near Turin, Italy. The deer family is the original natural host of the fluke. As far as known, it has not been reported from deer in Texas, probably because examinations have not been made for it.

According to Swales (1935), the closed cysts which are characteristic of the infestations among the large Bovidæ prevent the eggs from escaping and the life cycle cannot be completed. Thus infestation in cattle must originate from deer or sheep. The fluke is very pathogenic for sheep but it is rarely found in this animal. It is of interest to note that Dr. Mark Francis described the fluke and mapped its distribution in Texas in 1891.

Among the nematodes the small trichostrongyles are very common in both sheep and cattle. In addition to the findings at College Station, the writer has examined an extensive collection of the worms which was made in the field by Dr. H. Schmidt, Chief of the Veterinary Division of the Texas Experiment Station. A common species is *Ostertagia ostertagi*, a rather recent finding in Texas. Severe infestations of this parasite have been observed by Doctor Schmidt. *Trichostrongylus colubriformis* is often found in association with this species. However, species belonging to the genus Cooperia are more common than others belonging to this group. Among the beef cattle under two years of age belonging to the College, rather heavy and almost pure infestations of *Cooperia* spp. have been found; chiefly *C. pectinata* and *C. punctata*. Dr. R. D. Turk of the Experiment Station staff has found that *T. colubriformis* in sheep outnumbers all other species 10 or 15 to one. *Cooperia curticei* is another of the more common species found in sheep by Doctor Turk.

Complicated Food Poisoning of a Dog

At about 8 p.m. on May 31, 1939, a seven-month-old, male, wire-haired fox terrier was presented to the writer for treatment, the owner believing the animal to be suffering with distemper. This, however, was obviously not the case, the temperature being 100.4° F. and no suggestion of the distemper complex observable. The dog had appeared normal at noon, when it was fed. It had later had access to several quarts of spoiled, canned cherries.

The animal walked cross-legged and very unsteadily, swaying from side to side; occasionally it fell, rising immediately; scoliosis was marked, with some degree of opisthotonos. There was evidence of extreme weakness, stupor, and impaired vision as the patient stumbled about, aimlessly walking into any obstacle. The pupils were dilated and did not constrict upon the application of a direct, strong light. The animal was in a good state of nutrition. The respirations were accelerated; pulse rapid but small, weak and regular. The abdominal cavity was distended and a large nodular impaction of the intestine was palpable with no pain response. This obstruction contraindicated the use of apomorphine.

One ounce of a saturated solution of magnesium sulphate was given per os, to retard absorption and to flood the intestines with fluid. This was followed in six hours by a copious defecation, the excrement containing more than 500 cherry seeds, and much foul fecal material in an advanced state of putrefaction, judging from the odor. Because of the condition of the animal enemata were not employed until about 12 hours following the medication; they produced more of the cherry seeds and the foul fecal material. The entire symptom complex had disappeared during this latter period, and the patient drank about one quart of water the following day. During this time all food was withheld but water provided ad libitum. Complete recovery followed rapidly, and the patient was discharged on June 2.

H. D. PRITCHETT.

Doylestown, Pa.

Venereal Infections of Cattle

Their Manner of Spread and Their Eradication

By S. H. McNUTT
Veterinary Research Institute
and F. E. WALSH
Department of Veterinary Obstetrics
Iowa State College, Ames, Iowa

VENEREAL infections of cattle are on the increase in the central west. As these diseases increase, the demand for attention from individual owners will increase, and if the veterinarian is not prepared to care for this type of trouble, others will attempt to do so. But the care of these conditions requires considerable knowledge, skill and experience, which cannot be easily acquired by the uninitiated; and this fact places the responsibility for such care upon the veterinary profession.

The purpose of this paper, based on the monthly observation by the authors of over 2,300 head of cattle (the average number under our care for the past several years), is to show the reason for the increase of venereal infections of cattle and to suggest a plan for the correction of such infections in individual herds.

Although Bang's disease is still the first thought of many when breeding diseases are mentioned, it is not discussed in this paper. Brucellosis undoubtedly still causes loss of calves and retained placentæ, and opens a path for secondary infection, however, veterinarians and farmers generally have learned fairly well how to live with it or to eradicate it, depending on their desires or needs.

■ Only a short time ago, many felt that almost all breeding diseases due to infection were caused by the Brucella organism. Now some are beginning to assume that those conditions not due to Bang's disease are nearly all caused by trichomonads. This false conception is perhaps aided by written reports of bovine trichomoniasis, most of which imply that the infection is very prevalent. Many of them conclude with a statement to the effect that in the absence of Bang's disease, the manifestations of breeding diseases are very suggestive of venereal trichomoniasis. Apparently it is agreed that the histories and symptoms are so similar that the two diseases cannot be differentiated on these alone. In general this is true, but neither can the other infections that cause breeding trouble be differentiated on these criteria.

As a matter of fact, if Bang's disease be omitted, trichomoniasis still is not the main cause of breeding trouble in the middle west. In previous reports from Iowa [1, 2] some effort has been made to show the incidence and relative importance of *Trichomonas fœtus* infection in this region. In the first report it was estimated that about 10% of the herds having breeding trouble not due to Bang's disease were trichomonad-infected; in the second report, the percentage remained about the same. In other words, in this area approximately only one of ten herds that have breeding trouble in which Bang's disease is not involved, is affected with trichomoniasis.* It seems reasonable to assume that other regions of the country also have some infections other than the Bang organism and trichomonads that interfere with reproduction.

Our interest lies not so much in trichomoniasis as in other breeding diseases. Special mention is made of these conditions in a previous report [6] as follows: "A condition of unknown etiology, attended by poor breeding efficiency, and characterized by numerous cases of cervicitis, vaginitis, with more or less mucopurulent exudate and some cases of abortion and pyometra, is frequently observed in breeding herds of cattle. Since its cause, or causes, are unknown, but its clinical manifestations are so uniform in herd after herd, it is men-

*The reports from the adjoining states of Minnesota,[3] Wisconsin,[4] Nebraska and others are not numerous although trichomoniasis is known to exist in most, if not all, of them. For the most complete review of the literature on trichomoniasis the reader is referred to the work of Stableforth, Scorgie, Gould and White.[5]

tioned as a single disease, although eventually it may prove to be several or any one of several different diseases. Its appearance may be gradual or sudden and of such severity as to result in temporary sterility of all cows in the herd." In addition, there are herds affected with acute vaginitis of unknown cause and with cervicitis. Any one or all of these breeding troubles may be present in the same herd so that cows standing side by side may be affected differently. We have isolated streptococci, staphylococci, colon organisms, diphtheroids and molds from these cases of venereal infections, but it is not certain that any of them is a specific cause. Our attempts to find a filterable virus have met with failure; this is also the experience of others.

A common factor in these conditions, as well as in trichomoniasis, is that they all appear to be venereal infections mainly carried by the bull. That they are on the increase is due largely to the faulty application of a program of cattle breeding that has been promoted for the past many years.

■ First, the program calls for the use of proved sires. While the use of proved sires is of itself a good policy, the fault in the program lies in the fact that no account is taken of health and disease. A bull proved in a high production herd is a valuable animal only if he is healthy; a liability if not so. A healthy, high-index sire should be used only in healthy herds and upon good cows. This seems self-evident; in practice, however, this is not the policy. Stockmen apparently feel that a desirable pedigree and a high index immunize a bull against disease. Healthy, proved sires are taken from clean herds and placed in diseased herds, where they settle few or no cows and themselves become infected so that their value is only that of beef; diseased sires are moved to healthly herds where they set up fresh areas of infection. A point to be borne in mind in connection with the use of proved sires is that they are in general older than unproved animals. It is known that old bulls are usually more easily infected than young bulls; often young bulls will breed infected cows and not become infected, whereas older animals almost invariably become infected. (This greater resistance seems to be due to the vigor of the younger animals.) Also, of course, an old bull which has been in active service is more likely to have been exposed to infection.

Second, the program of herd improvement

In 1934, under the provisions of the Jones-Connally Act, a cattle reduction program was undertaken by the U. S. Department of Agriculture. It was decided to confine the elimination of cattle in dairy herds to those reacting positively to the agglutination test for Bang's disease, on the sound theory that if the size of the herd was going to be reduced, it was better to slaughter diseased animals than healthy ones. This automatically placed the project under the control of the Federal Bureau of Animal Industry and it was made a cooperative project with the state live stock sanitary authorities.

The project developed into a Bang's disease eradication program and many cattle owners assumed that if Bang's disease were eliminated from their herds, their difficulties with abortion and sterity in their cattle herds would be solved. This expectation has been responsible for many headaches, since in something like 25% of the cases the dairyman's breeding problems were not solved by the elimination of Bang's disease.

This discussion deals with perhaps the most important cause of reproduction irregularities next to the *Brucella* organism—the nonspecific venereal infections of cattle—and adds materially and importantly to the very limited knowledge available on that subject. It points out too, a grave weakness of the proved sire plan.

calls for the purchase of "valuable" she stock, although most successful stockmen try to raise their own replacements. As in the case of the bull, a cow with a high production record is valuable only if free from venereal infection; but again this is a point not often considered by cattlemen, nor even by many veterinarians. Valuable herds are very often ruined by the introduction of a single diseased female. In addition, infection is often spread through the joint ownership of bulls. If the herd of one of the partners has or contracts a venereal infection, he immediately concludes that the bull then in use is at fault, for by some strange process of reasoning cattlemen believe in these cases that the bull is impotent and the cows always free of disease. He then obtains a clean bull from one of his partners, and immediately ruins this bull also, and usually a third, by breeding his infected cows, so that the herds of all the partners are eventually diseased from the interchange.

■ How is the veterinarian to cope with this situation? Except in rare instances, he is not in a position to tell the prospective purchaser of a cow or bull that an individual herd is infected with a venereal disease. At present, he can manage only the individual infected herds in such a manner that the diseases will be eradicated in those herds—and hope that one outbreak of venereal disease in a herd will be sufficient to educate that particular cattle owner to be more prudent. It should be noted that the word "eradicate" is used. Control without eradication is not possible, for as long as one infected animal remains in a herd, others may contract disease through breeding operations.

Of course, prevention is the method of choice. However, the seriousness of venereal diseases is not recognized by cattle raisers, and veterinarians are unable to prevent the introduction of infected animals into healthy herds. The problem therefore becomes one of eradicating disease from an infected herd. It is not contended that the eradication of venereal disease from single breeding herds after the damage is already done will accomplish much in the prevention of genital infection in the cattle industry as a whole, but until the cattlemen themselves understand the danger and demand correction, the individual diseased herd must be cared for where such attention is asked.

The procedure for the eradication of venereal diseases of cattle is totally different from that of occasionally treating the sequelæ of Bang's disease or the individual cases of retained placenta. Such procedure suffices in these conditions, but is of no avail in venereal infections. In the control of breeding diseases there are many factors involved; the problem is intricate, and requires knowledge and experience, so that the stock raiser himself is unable to direct a proper attack. Hence, he cannot direct a veterinarian in what he "thinks" is a proper policy, and obtain desirable results. The failure of such practices in the past accounts for the lack of interest on the part of veterinarians in control of venereal infections. However, these diseases can be corrected, but only if the veterinarian directs the attack and promulgates the regulations, which are carried out with the hearty coöperation of the owner.

It cannot be too strongly emphasized that compromises and half-way measures have no place in the eradication of breeding diseases. Where one is asked to compromise, no attempt should be made. Eradication measures are much more difficult to carry out when other conditions that resemble venereal diseases are also present. The malady that causes most trouble in this regard is Bang's disease. Whenever possible it should be eradicated from infected herds. This can be accomplished at the same time measures for the elimination of venereal troubles are in progress.

■ The following measures for the eradication of venereal diseases have been employed successfully by the authors; similar measures have been employed by others who have had success in this field.

1. *Preliminary Measures.*—All mating is discontinued until a thorough study of the condition of the cows and bulls in the herd

A practical setup for the examination of a patient for pregnancy and sterility. Every possible effort is made to maintain cleanliness. The man wearing the rubber apron is Dr. H. E. Kingman, Cheyenne, Wyo.

has been made. Very often one must depend on a laboratory examination to classify the disease and to identify the infected and healthy; and even then borderline cases are confusing. A general history of the herd is obtained, and a study is made of the herd management, feeding, and the sanitary condition of the premises. One must employ every aid possible in correcting any disease condition, and it has been learned by experience that herd management and feeding are of major importance in controlling venereal diseases. Superficially, one might assume that feeding has nothing to do with venereal infections; space does not permit a discussion of this error, but it may be categorically stated that proper feeding is an important factor in the correction of breeding troubles.

2. *Handling and Management of Cows.*—The diseased cows are segregated from the healthy. After proper classification of the disease and a detailed study of the herd one is in a position to know how elaborate segregation must be. Certainly it need not be as rigid as for Bang's disease. Separation of the diseased from the healthy is made, first on a detailed breeding history of each individual cow, and second on a thorough rectal and vaginal examination of each cow. Cows that are pregnant and have negative histories, and also virgin heifers, are considered clean. Also, cows that have calved normally and have not yet been bred are passed as disease-free if the histories and examinations are negative. Permanently sterile individuals are sold. Those with diseased genital organs are considered infected. These disease conditions include vaginitis, cervicitis, open cervix, metritis, endometritis, or abnormal conditions of the ovaries or tubes. This first examination, together with the individual histories, serves as a basis for the initial separation of the diseased. However, an animal that appears to be normal today may not be so a few days later; a cow that is apparently safely in calf may abort for some unknown reason. Therefore, the pregnant and seemingly normal cows are gone over two or more times within the first 12 weeks, and any showing symptoms or lesions of disease are placed with the infected.

These reëxaminations are made at those times when the infected are treated and the cattle bled for the Bang's disease test. On such occasions it is important that the healthy group be examined first and the

infected later. After the diseased have been cared for, none of the healthy should be examined on that trip; the same thing holds true if one inadvertently handles a diseased animal before the healthy have been taken care of. Even while examining the healthy, reasonable care should be observed to minimize the chance of carrying anything from one cow to another should any of the supposedly healthy happen to be infected. Thus, although one is handling the herd as a whole, the unit is still the individual cow, and much of the success or failure of the plan depends on the thoroughness of the examinations and judgment in disposition.

3. *Handling and use of bulls.*—Bulls that are once infected with a venereal disease are seldom, if ever, good breeders thereafter, and the best plan is to sell them for slaughter immediately. Bulls in use in infected herds are usually all diseased, although youngsters may be free. Hence, it is desirable, and should be almost mandatory, that all bulls in service be sold. The authors have found this procedure to be economical in the long run. It is understood that an occasional infected bull will recover; however, it is necessary to test questionable or apparently recovered animals before they are put into regular service. For this purpose, the questionable bull is bred to five or six clean heifers that one is willing to sacrifice should they become infected.

To replace the bulls that are sold, young, clean bulls, preferably ones that have never been in service, are selected. Newly-acquired young bulls may become infected by accident—a serious loss in the case of high-priced animals. It is therefore usually advantageous for the owner to sacrifice the pedigree of the new-born calf by using a cheaper bull until the herd is put in the proper condition. This is a point that is hard for the stock owner to understand, because so much has been said about pedigrees and so little about disease processes. In herds of good size, two young bulls are obtained; one for use on cows that have never shown disease, the other for cows that have been infected but have apparently recovered, and on repeated examination have shown no abnormal condition. No bull is ever mated to a cow while she is showing an abnormal condition.

In regard to artificial insemination, there is no place for this procedure with infected cows. In addition, disease can be carried from infected bulls to clean cows by artificial insemination. Thus, this procedure does not differ greatly from the natural mating of cows with bulls; for in both cases the males and females must be healthy.

A distinction must be made between a slow bull and one that is infected. A slow individual should not be condemned. Some such bulls are able to settle only one cow every two or three weeks. After service the sheath of the bull may be irrigated with a 2% Lugol's solution, although it is not contended that this mild antiseptic will kill many organisms.

4. *Treatment of cows.*—Cows sufficiently valuable as to pedigree or milk production are treated; the others are sold. In tending the diseased group, those showing the least abnormality are handled first, leaving the badly-infected until the last. Here again, reasonable care is exercised to prevent carrying infection from one cow to another even though they are all in the diseased group.

When an animal has apparently been cured, and two or more examinations have shown her to be clean, she may be bred at the next heat period. After breeding she must be watched and at six and 12 weeks examined for pregnancy. This catches some early abortions that otherwise often pass unobserved at six to 12 weeks. In the event of an early abortion, even though the uterus returns to an apparently normal condition in a period of 28 days, the cow is not returned to the bull for a minimum of 90 days. If a cow does not conceive at the first mating something is wrong, because every normal cow will conceive at a single service.

■ The foregoing furnishes a brief outline of a successful method for the handling of herds infected with venereal diseases. A diagnosis is made upon a consideration of the points mentioned, but particularly on

the breeding history and a clinical examination of all breeding animals in the herd. One cannot conclude from the evidence from one or two cows that the condition is a herd disease. In diagnosis it is helpful also to know that certain cows do not become infected when bred to an infected bull. In rare instances diseased bulls may infect only a relatively small number of cows; in contrast to this, all may be infected. Some cows have a natural resistance; some are resistant only after recovery from an attack. Thus it sometimes happens that a herd harboring infection will have a fairly good breeding history, but that a bull going from such a herd to a clean herd may infect most or all of the cows in the second herd. The possibility of latent or dormant infections should be considered. Breeding troubles sometimes develop in herds that have previously been free and in which the source cannot be traced. In such cases, there is the possibility that some organism has become pathogenic under certain circumstances. Certainly when infection appears apparently from nowhere, the disease behaves as does any venereal malady.

As already indicated, the veterinarian should not attempt to hurry matters in the correction of breeding diseases. The animals are given plenty of time to recover before an attempt is made at reproduction. In infected herds the disease is the important thing and reproduction will follow naturally once it is corrected. In this connection, one sometimes experiences a little difficulty with the owner or herdsman who may think the cows are not being bred as soon after recovery as they should be.

Success depends on thoroughness, good judgment and much work. There are no short cuts nor easy methods. It will be noticed that actual methods of treatment of retained placenta, metritis, vaginitis, etc., have been omitted. This is partly because these procedures have already been discussed elsewhere, and partly because in the opinion of the authors they have been over-emphasized as control and eradication measures. Proper handling of the entire herd is the important feature. No good comes from treatment of the obviously diseased animals and disregard of the remainder of the herd. Where this is attempted, both veterinarian and owner become disgusted, and give up the program of veterinary supervision of the herd. On the other hand, where proper procedures are instituted, results are easily demonstrated, and the owner insists that the veterinarian continue in an advisory capacity and in close touch with the herd after infection has been eliminated. This is especially true in larger herds.

Results come gradually or even very slowly particularly where, through error, another venereal disease gains entrance during the period when one is attempting to eradicate an infection already present, where there is a severe flare-up of Bang's disease, or where one does not attempt eradication of Bang's disease at the same time. When eradication measures are successful, the cows in the clean part of the herd settle satisfactorily and individuals in the infected part gradually overcome the infection and settle when bred. They are then returned to the clean herd so that the infected herd becomes smaller and smaller and the remnant, largely of incurables, is eventually sold. In the smaller herds and sometimes in the larger herds, this is accomplished in a few months. In the larger herds the procedure usually requires close to a year.

There are herds in every community that need immediate attention. We recently had opportunity to go over the record of one herd of 100 milking cows where, due to venereal diseases, production was $3000 a year under what it should have been.

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Bang's Disease Eradication from a Practitioner's Viewpoint

By S. L. STEWART, Olathe, Kansas

THE agglutination test for Bang's disease is a valuable aid in diagnosis of herd infection, but is less efficient in picking out cows that have aborted or will abort. Sometimes abortions occur in both infected and non-infected herds as a result of nutritional deficiencies, usually mineral or vitamin deficiencies, but sometimes because of insufficient feed or a ration of poor quality in general. Supplying a proper ration to such animals will prevent abortions due to nutritional inadequacy whether they be in infected or in non-infected herds.

The majority of abortions appear to be due to a combination of nutritional deficiency and infection and such animals require treatment for both conditions. Where this is given, a large percentage of them are cured. Some will become negative to the agglutination test and some will continue to give a positive reaction as long as they live, but will be good producers. It is wrong to destroy such animals in commercial herds because they react positively to the blood test for Bang's disease. If properly vaccinated, they will deliver live calves and will not spread the infection which, presumably, they are still carrying.

Testing for Bang's disease and eliminating the reactors with a view to maintaining a Bang's disease negative herd is the proper way to handle the Bang's disease problem in certain exceptional cases, but it is a mistake to apply it as a routine practice. Where the herd owners' interest is chiefly in the sale of animals, particularly purebred animals, and where the percentage of reactors in his herd is low, test and slaughter is often the profitable course to follow. If the percentage of reactors is large and he still wishes to attain a Bang's disease free herd, there is a less expensive procedure than the test and slaughter method.

For the commercial dairy herd, the test and slaughter method is only exceptionally advisable. In all my experience in handling Bang's disease since 1922, in commercial and dairy herds, I have had only one that was freed from Bang's disease by the test and slaughter method, that has remained negative. This herd is worthy of attention. A wealthy city man bought a country home, including a dairy herd. The purchase was made after the permit to sell milk in Kansas City had been revoked for this herd and the new owner found he had plenty of cow trouble on his hands.

Since he could not sell milk on the general market, he decided to produce certified milk. The herd consisted of 56 cows, all tuberculin tested. They had had a physical examination every 30 days up until just before the purchase and mastitis had been eliminated. I blood-tested all the animals in this herd every 60 days. On the fourth test there were no positive reactors and no suspects. On the fifth and sixth tests there were reactors, but there have been none since. In other words, the herd was completely and permanently cleaned up in one year. Altogether, 27 cows, approximately 50%, were condemned on the blood test.

It required a tremendous amount of cleaning up of the barns and premises and one retainer lot was even floored with concrete. In a few months longer this herd was able to get on the certified milk list and has remained there ever since. The herd now contains 46 cows, 15 heifers and two bulls. There have been no additions in four years, except heifers raised in the herd. The 27 condemned cows sold for $1,620. Their value as milk cows was $2,700, not counting the loss in milk and their calves, making the cost of eradication $1,080, plus veterinary fees and the cost of cleaning up and disinfecting.

But the cost is not always so moderate, nor the results so good. Another herd of

exactly the same size, in the same neighborhood, was tested by Federal inspectors. Half of these cows were removed on the first two tests. On the third test, all remaining cows were negative. The fourth test was not made until six months later, when five reactors were found. One year later, I was employed to test the herd and found ten reactors. In this herd, replacements had been purchased, but all according to the test certificates supplied, were negative to the test when purchased. The loss on the cows removed by the test amounted to $1,260 for this herd owner, and after two years he still had an infected herd and quit testing in disgust. Of course, it has been fully demonstrated that an infected herd can be cleaned up by the test and slaughter method. Nobody questions that. It must be admitted also that in a considerable proportion of herds it offers considerable difficulty and entails an expense beyond the capacity of many dairymen to absorb and remain in business. Further, no one yet knows whether it is the strict sanitary measures that protects the herd or whether it is some unknown factor. Every practitioner knows of herds in every infected community that are free of Bang's disease and have remained free from the clinical manifestations of Bang's disease over a long period of years where not a single sanitary precaution has been taken by the owner to prevent the introduction of the disease. In fact, where the owner neither knows nor cares anything about the disease.

It is one thing to state that disregard of the regulations of the Bang's disease eradication project is responsible for the reintroduction of the disease into a herd that has been freed of it—but it is a far different thing to prove it. Just the opposite condition also arises to plague one. It is easy to point to a herd that has been cleaned up and kept clean by a strict observance of the rules but not so easy to say why the herd on an adjoining farm is also clean where the owner doesn't even know if there are any rules.

Removal of all of the reacting cows from the dairy herds supplying milk to Kansas City is going to be a severe hardship on many of the dairymen in this locality. The majority of all raw milk herds are now tested. However, all the raw milk herds and equipment and sanitation are in very good condition owing to the monthly veterinary examination they have had to meet the city health commission requirements.

Over a period of 17 years, vaccination for the prevention of Bang's disease has reduced the loss and increased the calf crop without exception in my experience. The vaccination does not increase the number of animals that eliminate *Brucella* organisms, nor does it retard conception nor increase sterility. A vaccinated animal does not communicate the disease to other cows and I doubt very much that it is possible for her milk to convey undulant fever to man.

Negative cows when vaccinated become positive reactors for a few months and then again become negative. Approximately 50% of the positive cows that have not aborted become negative a few months after vaccination. The others continue positive. Only an occasional cow that has aborted ever becomes negative after vaccination, but they cease to be spreaders of the disease.

Cow trouble due to secondary invaders, mastitis, retained afterbirth, metritis, sterility, dystocia, etc., are no more common in vaccinated herds than in free herds. In other words, the dairyman who either frees his herd of Bang's disease by the test and slaughter method or who vaccinates his animals, gets rid of most of his mastitis, metritis, retained afterbirth, sterility, delayed conception, etc., in the same degree, the difference being the man that vaccinates still has all his productive cows. The man that tests and slaughters may lose anywhere up to 75% of his herd before he is finally free of the disease. The decrease in the loss from mastitis, metritis, etc., will reimburse the herd owner many times over for the trouble and cost of vaccination.

That my experience with vaccination in the control of Bang's disease is not unique

is indicated by the continually increasing use of the vaccine in the face of extraordinary official opposition and hindrance. Records of the Bureau of Animal Industry show that the production of vaccine has increased 1700% since I began using it.

Bang's disease is essentially a disease of pregnant cows; the immature heifer is highly resistant, and when she becomes blood positive will within a few weeks become blood negative, if removed from the source of infection, and a large percent will become blood negative even if retained in the same environment. I believe in and practice calfhood vaccination, but lasting results have not been altogether satisfactory. In my experience the greatest value has been attained and the highest degree of resistance has been produced by vaccination of pregnant cows. If the cow is not infected, one may be assured that she will continue free from the disease in a very high percentage of the cases. If she is infected, the results are equally satisfactory, except where the disease has progressed to a stage where separation of the maternal and placental cotyledons has commenced. When this has occurred, the cow will abort whether or not she is vaccinated.

Bang's disease vaccination has not been 100% effective in my hands, but of the whole number of herds in which I have used it in the past 17 years, it has been 95% effective and that is high for me. I am not a one-hundred-percenter in any line of work. I should hate to think how quick I should have to quit treating colic, dystocia, or azoturia if a loss of 5% made such treatment prohibitive.

Because of official disapproval of vaccination, I have never promoted this work. I have more than 100 herds that have come under my control in which I have vaccinated all or a part of the animals. In every instance the owners have come to me (or written to me from a number of states when I would supply them with advice and refer them to their veterinarian) to have their animals vaccinated or for advice as to how to handle their problem. If the herd were a commercial producing herd, and I was convinced in my own mind that freeing the herd of reactors would not be profitable, I advised vaccination. However, some of the vaccination that I do is not complete herd vaccination, but just the vaccination of aborting animals in infected herds. In chronic cases that continue aborting, I vaccinate them once before they are bred and as much as three times during their next pregnancy, making four times in all. The results from vaccination during the past four years have been 96% of living, healthy calves. This is better than the results obtained prior to 1935. I believe the vaccine available now is better than formerly and that, as a result of a considerable experience with vaccination I understand better how to handle an infected herd.

The case of a family cow on a suburban place is illustrative. I was called to remove a retained afterbirth from this animal, a Jersey, which had aborted only a few days after she was purchased, and a blood test gave a positive reaction. The people could not be induced to sell the cow or to have her vaccinated, although warned of the possible danger of using her milk. In due time, a second abortion occurred and another retained afterbirth and a second positive agglutination test. The cow was then vaccinated and vaccinated again after she was bred. The family of three adults and three children used milk from this cow continuously for three years and none contracted undulant fever. The cow was then sold as a negative cow into a Grade A, raw milk, negative herd and has delivered a living, healthy calf every year for the past six years. She is now 12 years old, has a normal udder and is a heavy milker.

Another dairyman in the same locality bought a registered Jersey out of a certified Bang's disease free herd. When she was given the agglutination test along with the remainder of the herd, she was found positive and sold for slaughter at a loss. My experience has been that vaccination would have saved the cow for the owner and would have caused no danger to those that consumed her milk.

Another typical vaccination experience is that in two good grade herds, acute abortion broke out at the same time. The agglutination test showed so many infected animals that to slaughter them would have ruined both dairymen financially. Both herds were vaccinated. The loss was very small. The cows are still milking well and both owners are well satisfied with the results.

* * * *

Vomiting in Cows

I would like to report two cases of vomiting in cows to add to the discussion of this subject (*Vet. Med.* April, 1939, p. 203; May, 1939, p. 321; June, 1939, p. 345).

Case No. 1.—August 3, 1938, a purebred Guernsey cow eight years of age, on official test and receiving large quantities of sweet clover silage four times each day, began retching and, some two hours later, vomiting, the vomitus consisting of brown ingesta with a peculiar but not fetid odor. Examination showed temperature 101.8°F, pulse 68, respirations normal. The animal was given a mixture of 2 oz. aromatic spirits of ammonia, ½-oz. chloral hydrate, 1 oz. ginger, in two quarts of water, followed by two quarts of mineral oil through a stomach tube. Recovery was prompt and complete.

September 13 the cow began showing the same symptoms, but with a slightly higher temperature. In the interim she had been gradually returned to the sweet clover silage, and had again been receiving large amounts during the previous week. The same treatment again brought prompt recovery.

None of the other test animals were affected by the clover silage, but from the history it appeared that it was this which caused the disturbance in this cow. The feeding of the silage was discontinued in her case, and no more difficulty was experienced.

Case No. 2.—May 23, 1938, a five-year-old Holstein cow came in at night vomiting a fetid, sour, cream-colored liquid with little ingesta through both nose and mouth every few minutes. The animal had not been normal for three days previously.

The temperature was 106°F., pulse 100 plus, respirations 70 and shallow. There was a painful, suppressed cough, followed by the vomiting. The animal was evidently moribund, and no treatment was attempted.

Post-mortem examination revealed that an eight-inch piece of wire had punctured the reticulum and extended about four inches into the right lung, which was nearly filled with a large abscess. This had recently ruptured, and much of the vomitus was probably pus from the abscess.

These cases are given as two examples of the wide variety of causes of vomiting in cows.

H. B. WALTERS

Newark, N. Y.

* * * *

Actinomycotic Abscess in Nasal Passage of a Cow

May 12,1939, a Holstein cow was presented to the veterinary clinic of Kansas State College with the following symptoms: dyspnea, head and neck distended, mucous discharge coming from the nostrils, and a slight enlargement on the right side of the face just over the maxillary sinus. The owner stated that the condition had gradually become more severe over a period of three or four weeks. No other history was available.

A phenendoscope was used for auscultation of the lungs. The trachea and throat were examined by palpation and the mouth by the aid of a speculum. A stomach tube was passed through the mouth and the left nostril. When the right nostril was probed, the tube could be inserted only approximately 2½ inches, thus showing an obstruction of the right nasal passage.

Treatment.—The animal was confined on its left side. A knife was placed in the nostril and the anterior end of the swelling incised. A cupful of suppurative material was discharged from the nostril. Microscopic examination of this material showed it to be actinomycotic. A trephine opening was made just above the third upper premolar on the right side. The area was examined and it was found that a large amount of tissue had filled in the maxillary sinus. The animal was given one ounce of sodium iodide in 500cc of distilled water, and iodine in the feed.

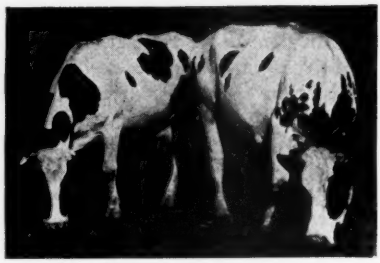
Prognosis.—The prognosis was unfavorable, as the tissue in the maxillary sinus may continue to grow and close both nasal passages.

A. L. MALLE

Mulberry, Kans.

Cattle

By DONALD C. INNES, Axtell, Kansas



FROM the earliest times of which we have any record the wealth of nations and of individuals has consisted, in a large part, of cattle. Our word "pecuniary" derives from the Latin word *pecus*, meaning "cattle," and so commemorates the use of cattle as money in ancient times. Similarly, the word "cattle" is derived from the same source as the words "chattel" and "capital," the common original meaning being "goods" or "property."

Domesticated cattle have been derived from the wild species of the genus Bos. (Thus the colloquial designation "bossy," frequently applied to the cow, is of strictly scientific origin.) Bos is one of the largest genera of the family Bovidæ, as well as the most specialized division. The members of this family possess hoofs with an even number of toes, and have persistent horns with a bony horn core. There are five subgenera of Bos:

1. Taurine, which includes our common cattle and the humped cattle of Africa and Asia.
2. Bibovine, composed of the guar, banting, and gayal.
3. Leptobovine, an extinct species.
4. Bisontine, which includes the yak and bison (buffalo).
5. Bulbaline, the buffalo group (water buffalo of the East).

Cattle first appeared in late Pliocene times in Europe and are thus among the most modern in origin of all our domestic animals, except perhaps sheep.

It is believed that all present-day types of cattle known in Europe and America, aside from the Brahman breed of Indian origin, are principally descendants of two aboriginal races, *Bos primigenius* and *Bos longifrons*.

Bos primigenius was a large and stately animal, six to seven feet high at the withers and 12 feet in length. It is described as being "great in strength and great in swiftness." It was a forest-loving creature, roaming over western Asia, northern Africa, and Europe during the Pleistocene and Recent epochs. Judging from old pictures, it had a hairy coat which varied in color from black or dark brown in summer to gray in winter. A light-colored ring encircled the muzzle, and along the back was a white stripe. The Teutons knew it as the aurochs or ur, and Cæsar spoke of it as urus.

There is much evidence to show that the wild ur or urus has lived within historic times. Cæsar knew of it as an inhabitant of the Hercynian forest. Tacitus and Pliny say that the horns of these cattle used as drinking horns sometimes held as much as 12 liters. Authentic accounts written as late as the first half of the 16th century mention these animals.

Bos longifrons is the Celtic shorthorn found in England. Compared with primigenius, longifrons is much smaller and has a shorter face but a longer and broader forehead. The horns are shorter and there is a ridge in the center of the pole. Its remains are found in the lake dwellings of the stone period; apparently it was the most important domestic animal of that age from the North Sea to Italy. During the Roman occupation it lived in England. Some authors think that longifrons arose from primigenius by stunting, by domestication, or by a mutation.

Most authorities look on central Asia as the original home of man as well as of the ox. Domestication probably took place about 8000 B. C. The migrations of man were to the west and southwest; hence, we find a resemblance between the cattle of Asia and Egypt.

Cattle were the most prized of all animals in Egypt. The highest goddess was worshipped in the form of a cow. They gave their cattle pet names and talked with them as we do with dogs.

During the Neolithic, or polished stone, period there was an invasion of Europe by Asiatics who brought with them some domesticated animals. At the beginning of tht Bronze age the number of domestic animals increased. In central Europe, cattle breeding had an important place in the industrial life of the lake dwellers. The Mycenæan age of Greece (about 1500 B. C.) was contemporary with the last of the lake dwellings.

In Greece most of the pasturage was poor, yet there were white, hornless cattle, and a large breed of cattle improved by Pyrrhus about 300 B. C. He selected his breeding stock according to strict rules. No heifers were allowed to breed until they were four years of age. Some of his cows gave 40 liters of milk a day.

Italy was a land much better adapted for cattle raising than Greece. The Greeks referred to Italy as the land of cattle. Some think the word Italy was derived from the Greek word meaning "bull," although others ascribe the origin of the word to Italus, a mythical king.

Among the Romans, the draft ox was considered invaluable, and to kill one was as serious a crime as to kill a man. Each province had its own breed of cattle. The smaller breeds in the valleys of northern Italy yielded a good flow of milk which in the spring was considered good medicine. Many Romans went to the herds of Switzerland for a cure of tuberculosis.

From very ancient times, all the peoples of Europe had cattle of the primigenius and longifrons types. These were especially developed by the British, Dutch, French and Swiss. Up to comparatively recent years all the world's most widely disseminated improved types had their origin along the shores of the English channel—in Great Britain, upon the continental mainland just opposite, or in the islands off the coast of Normandy and Brittany.

Mention should be made of the wild, white cattle, several herds of which still exist in England. They have been bred pure for several hundred years, but close inbreeding has brought about a reduction in size, in fineness of bone, and in rate of increase. In the essential feature of the bony framework, however, they are still the nearest to the original wild forms of any living animals known. Most authorities believe them to be the remnants of *Bos longifrons*.

There were no cattle in America before the time of Columbus, although the bison flourished to a remarkable degree. On his second voyage in 1493, Columbus brought some cattle to the West Indies from Spain. These were carried to the mainland both north and south of the Isthmus of Panama and gave rise to the stock which later became known in the United States as "Texas" or "longhorn" cattle.

The first authentic introduction of cattle into the territory now included in the United States was by Sir Walter Raleigh in 1536 to his Virginia colony. But this colony soon perished and the cattle were probably slaughtered by the settlers. Aftr this, the colonists of the new world brought with them the various breeds developed in their native countries.

At the present time but 15 or 16 breeds are of economic importance in the United States, although from 200 to 250 breeds of European cattle are known, and fully as many Asiatic ones.

Though late in origin from an evolutionary standpoint, cattle have been one of man's constant possessions from early times, and an entire shift in the world's economy would take place should the species disappear.

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Empyema of the Frontal Sinus in a Heifer

February 6, 1939, a three-year-old, Holstein heifer was presented for treatment at the veterinary clinic of Kansas State College.

History.—The owner said that the animal stood around holding its head a little higher than usual and slightly to one side. At first he thought that there was someing in its eye. Two days previously, he had noticed a "sore" on its head in the region of the horn core. The animal had been dehorned two years previously.

Examination.—The "sore" proved to be a suppurating wound in the region of the left horn core, which admitted a probe directly into the frontal sinus. The frontal bone over the left eye was noticeably thickened. Diagnosis: empyema of the frontal sinus, probably due to infection following dehorning.

Anatomy.—In the cow, the anterior limit of the frontal sinus corresponds to an imaginary line passed through the middle of the orbits. Medially, it is separated from the sinus of the opposite side by a complete septum. Posteriorly, the sinus extends to the region of the poll, and laterally, to a point just anterior to the external ear. The frontal sinus normally communicates with the nasal cavity through the ethmoid cells, although these openings are very small and any swelling of the mucous membrane lining them will close the openings. One of the numerous compartments of the frontal sinus, the postorbital diverticulum, is virtually back of the orbital cavity and is separated from the temporal fossa by only a very thin plate of bone, so that infection in this region may involve the eye. In contrast to the horse, the frontal sinus of the cow is separated by many incomplete bony septa which greatly hinder drainage.

Treatment.—The animal was placed in a right lateral recumbency on the operating table. An area about two inches posterior and 1½ inches above the left eye was shaved, washed with soap and water, and disinfected with 1-1000 alcoholic sublimate. The area was infiltrated with a 1% procaine solution. A circular piece of skin and fascia one inch wide was removed, just medial to the bony ridge which marks the lateral limit of the frontal sinus. The bone was

Empyema of the frontal sinus

then trephined. The area around the suppurating wound was also shaved, disinfected, and anesthetized. The wound was then enlarged by cutting around its edges with a sharp scalpel. A long-nozzled dose syringe was inserted into the frontal sinus via the lower opening and the sinus flushed through with a 2% solution of potassium permanganate. By repeated flushings, a great deal of fetid necrotic debris was washed out. The openings were then packed with gauze plugs to prevent them from healing too quickly.

Aftercare.—The cavity was flushed daily with a 2% potassium permanganate solution. On the second day after the operation, the odor from the sinus was once more becoming fetid, so the cavity was filled with liquid bipp and the openings were plugged with gauze. On the third day, after flushing with the permanganate solution, a fresh amount of bipp was injected. The use of the plugs was discontinued. On the fourth day the cavity was

again flushed and a camphor-phenol solution (phenol crystals 1, camphor 2, mineral oil 3) was injected into the sinus. The animal was discharged on the fifth day, and the owner was directed to flush the cavity daily with a weak chlorazene solution and to inject some of the camphor-phenol preparation. Two weeks later the owner reported that the wounds were healing well and that there was a clear, thin, whitish, odorless discharge.

Comments.—Not all cases respond as well as this one. The determining factor is the amount of drainage which can be established. At times, the best one can do is to establish imperfect drainage to give temporary relief until the animal can be marketed. However, careful attention to the anatomical considerations involved will often yield surprisingly good results.

MORRIS A. NOSSOV

New York, N. Y.

Complete Right Torsion of Uterus in Cow

May 27, 1938, a call was received about 2 a. m. from a farmer living near Utica, Nebraska to see a five-year-old, grade, Holstein cow carrying her third calf. The writer accompanied Dr. D. E. Trump of Utica on this call and at the time of our arrival the patient was showing colicky symptoms, kicking at her abdomen, lying down and getting up, looking at one side, then the other, and voiding small amounts of urine frequently. Her exact breeding date was unknown, but it appeared that she would calve soon.

An examination was made by Doctor Trump. Finding nothing wrong with the digestive tract, he made a vaginal examination. Folds of the vagina in the form of spiral twists were found on the upper and lower walls. The upper folds ran forward and to the right, while those of the floor ran forward and to the left. This suggested a torsion of the uterus. Because of the spiral twists of the vagina, introduction of the hand to examine the cervix was difficult. The os uteri was not dilated in the least, and the mucous plug was still in place. A rectal examination disclosed a right horn pregnancy. The spiral folds of the uterus could be palpated through the rectal wall. The left mesometrium which was stretched tightly, crossing over the cervix, confirmed the diagnosis.

Preparations were made for an operation. Two ounces of chloral hydrate were given per os. The left side of the cow was shaved in the flank region and painted with tincture of iodine. In the meantime the instruments were sterilized by boiling. Epidural anesthesia was administered, giving 25cc of a 4% solution of procaine hydrochloride. This caused a paresis of the posterior parts almost at once. An additional 30cc of the same anesthetic was infiltrated into the skin in the operative area.

Burlap sacks were wrapped around the hind legs just above the hocks and a rope tied around each, leaving a loop in which was inserted a singletree, which in turn was attached to a block and tackle. By this means, the patient was elevated to a nearly vertical position. An incision was made in the operative area, through the skin and fascia. This was made large enough to accommodate the entrance of both hands. The abdominal muscles were separated by blunt dissection and the abdominal cavity opened. Both hands were introduced into the cavity and the uterus grasped with the hands and rotated 360° to the normal position. (Having the posterior part of the patient elevated greatly facilitated this manipulation of the uterus.) The peritoneum and abdominal muscles were sutured together with catgut, placing the sutures rather closely together. The skin was sutured with umbilical tape, using the mattress type suture. The operative area was then covered with collodion, and the patient removed to a well-bedded box stall. Here she was given 250cc of a 50% solution of glucose intravenously. Four days later parturition took place, and a normal calf was delivered without manual assistance. The cow made a complete recovery.

HERMAN A. JOKERST

Waco, Nebr.

Necrobacillosis of the Liver

Necrobacillosis of the liver, caused by *Actinomyces necrophorus*, is characterized by the presence of tumor-like, dry, nodular areas of necrosis in the liver substance. The disease occurs not infrequently in cattle, with the probability that the infection is pyemic from foot-rot or metritis.

Doctor Stanley, Hope, Kansas, observed 19 cases of necrobacillosis of the liver in his practice between Aug. 11 and Sept. 25, 1938, the cases occurring within a radius of 15 miles.

Only dairy cows with a history of parturition four to eight weeks previous to infection were affected. All had been fed grain rations and had been grazing on native pasture. All had a similar history of decline in milk flow and general condition for the past week or 10 days. On two farms two cows were affected; the other cases occurred singly.

The symptoms were anorexia, emaciation, enlarged lymphatic glands, and drooling from mouth and nostrils. The mucous membranes were icteric. There was tenderness on pressure or percussion in the region of the liver. Both temperature and pulse were elevated, especially 24 to 36 hours before death, when the temperature reached 106° F. and the pulse rate 90 to 110. Constipation and fetid body odors were constant symptoms. The animals showed persistent recumbency, and death occurred in five to seven days.

Various treatments were tried, but none were effective; all 19 cows died.

Post-mortem examinations were made of nine of the affected cows. All muscles and viscera were very icteric. The livers were enlarged to twice normal size. The gall bladders were greatly distended. Necrotic nodules varying in size from that of a pea to size of a dollar studded the livers. The nodules, especially the larger ones, were sharply defined from the icteric liver by their dark color and by a hyperemic zone surrounding them. The older lesions, and particularly those that contained caseated pus, were definitely circumscribed by a rather dense fibrous capsule, extending deeply into the liver. There was no evidence of metritis or of foot-rot.

The diagnosis of necrobacillosis of the liver was confirmed by laboratory examination, the younger lesions that were not definitely caseated containing a tangled mass of *Actinomyces necrophorus*.

J. A. ESKELDSON

Ramona, Kans.

Tetanus in a Cow Following Parturition

A two-year-old, Hereford cow was presented at the veterinary clinic of Kansas State College March 31 for removal of a retained placenta.

The cow had calved 10 days previously, without assistance. There had been no attempt made to remove the retained placenta. The day the animal was brought in for treatment it had developed a trestle attitude.

The abdomen was tucked up and the legs rigid. There was a very marked extrusion of the nictitating membranes, and the masseter muscles were drawn up in a severe tonic spasm, causing a knotted appearance. The dorsal muscles of the neck were contracted so that it was concave on the dorsal surface.

A vaginal and uterine examination disclosed a suppurative endometritis and vaginitis. Diagnosis: tetanus. The uterus was flushed out with a therapogen solution, and 250cc of a 25% dextrose solution and 400 grains of chloral hydrate in 500cc of sterile water were administered intravenously. The following day the cow was unable to rise, and all symptoms were intensified. Additional chloral hydrate (420 grains in 1000cc of normal saline solution) was given intravenously. A small, colt stomach tube was passed through the nostril and into the rumen, and six gallons of water pumped into it. The uterus was flushed out with a wine-colored solution of potassium permanganate. The cow died on the evening of April 1. Post-mortem examination revealed nothing of significance.

A very similar case in a two-year-old,

shorthorn cow was presented April 4. The general line of treatment was the same. This cow died April 12.

FORREST W. CLARK

Holton, Kans.

Torsion of the Small Intestine in a Cow

According to Hutyra and Marek, torsion of the intestine, although common in horses, is rare in cows.

January 15, 1939, a Holstein cow, weighing approximately 1050 pounds, was brought to the veterinary clinic of Kansas State College. The animal, which was on dry sorghum feed, had gone off feed the night before and had developed a bloody diarrhea during the night. Temperature, respiration, and pulse were normal. Microscopic examination of the feces for coccidia was negative. The rumen was hard and full, and rectal examination disclosed impaction of the rumen. In addition, a mass about the size of two fists and feeling much like a large blood clot was palpated on the small intestine.

A rumenotomy and an exploratory laparotomy were performed, using the method described by Frick (*Cor. Vet.*, Oct., 1929).

Following the rumenotomy, the small intestine was brought into view and a torsion involving 18 inches of the intestine was disclosed; the involved portion had already become necrotic.

A Péan forceps was used to clamp off the affected portion of the intestine, and this and the adjacent section of mesentery were removed. Using atraumatic needles and No. 00, 20-day catgut, continuous sutures were placed next to the forceps and the latter was removed. The two sections of intestine were brought into apposition with continuous Lembert sutures, and the first sutures were then removed. The Lembert sutures were then tightened and fixed. During the entire operation, the intestines were kept moistened with sterile physiological salt solution.

The intestines were replaced, the skin incision closed, and 250cc of 25% glucose and 2,000cc of physiological salt solution were given intravenously.

Subsequent treatment included the daily

The involved intestine brought into view.

intravenous injection of 250cc of glucose and 4,000cc of physiological salt solution. On the second and third days, two ounces of 0.05% arsenic and 0.05% strychnine were administered per os. The cow seemed bright, and ate a little bran on the afternoon of the third day. Six gallons of water and one-half pound of epsom salts were given at this time. On the afternoon of the fourth day, the cow began to bloat. A stomach tube was passed to relieve this condition, and one ounce of formalin in one gallon of water was given.

The cow died on the morning of the fifth day. Post-mortem examination showed that the skin and muscles were in the process of healing nicely. The incision in the rumen had healed over well. There was very little peritonitis. Necrosis of the intestine was present for six to eight inches on either side of the anastomosis; apparently this was due to a too limited blood supply.

A. M. CODDINGTON

Kansas City, Mo.

A New Operative Technique for Fistula of the Withers; Treatment with Lactic Ferments*

By G. PERRIN, Saint-Aulge, Nievre, France

THE newly-acquired knowledge of the rôle of brucella organisms in the etiology of fistula of the withers has led veterinarians to combat it, not with antiseptics, formerly in such repute, but with the latest weapons of bacteriotherapy: antivirus, bacteriophages, or ferments. As an immediate consequence, the operative technique has required modification; and it is the new technique which I purpose to describe.

After having used, for many years, the antivirus-bacteriophage mixture, then the antistreptococcic and antistaphylococcic antivirus, alone or associated with brucellosis antivirus, we have abandoned these cumbersome treatments and today give the preference to the lactic ferments, according to the method of Prof. Van Goidsenhoven,[1] director of the veterinary school at Brussels.

■ It has been recognized for a long time that pyogenic organisms develop only in an alkaline medium. Living lactic ferments, on the other hand, continuously produce lactic acid in their cultures. It can be readily seen that the lactic ferment, introduced into a wound infected with the usual suppurative organisms, creates a medium unfavorable for the latter, so that little by little they disappear and are replaced by the lactic ferments, which end by completely eliminating the other organisms. The wound, alkaline at the beginning, becomes acid; from a suppurating condition, it becomes red and swollen; cicatrization follows rapidly.

To obtain this result, it is necessary to have a continuously living source of ferments, producers of the lactic acid. Only the two ferments of Leben *(Streptobacillus Lebenis* and *Streptococcus Lebenis)*, cultivated according to the method of Prof. Van Goidsenhoven, are able to conserve their vitality after 18 years, as Prof. Petit has shown in a communication to the Society of Comparative Pathology.[2] By using them one is assured of the rapid implantation of the ferment in the wound, and the development of an active culture of ferments producing abundant amounts of lactic acid.[3]

These data being established, the opening of fistulas of the wither in the lower part in order to facilitate the flow of pus, the classical procedure, must be entirely abandoned. Treatment with lactic ferments necessitates an operation which has for its aim facilitating the development of a concentrated culture within the affected area, and preventing escape of this culture, which, by eliminating the pathogenic organisms and the necrotic tissue, leads to the rapid cicatrization of this large, suppurating wound. The operation which we shall describe answers this purpose, and the treatment with which it is followed assures a rapid, favorable outcome.

■ It is useful to remember that fistula of the withers is caused by an enormous increase in the synovial fluid contained in the little serous bursa which caps the upper extremity of the spiny process of the second dorsal vertebra, the bursa which normally facilitates the action of the two funicular portions of the cervical ligament at the point of its entrance into the first dorsal processes. The primary lesion of fistula of the withers is always at this point, although it is on the front of the withers that the liquid is collected, giving a deformation of the external aspect of this region.

This synovial dropsy is often a consequence of a brucella infection, fistula of the withers occurring simultaneously with an epizoötic of infectious abortion among the cattle on the same farm. Cases of fistula of the withers sometimes even as-

* Translated from the *Recueil de Médecine Vétérinaire*, 115:4, April, 1939, pp. 210-215.

sume epizoötic proportions among the horses on a farm where Bang's disease is prevalent. This fact was demonstrated bacteriologically in 1928 by Rinjard and Hilger.[4]

The purpose of the operation is then to evacuate the purulent synovial fluid and to substitute for it a culture of lactic ferments which will eliminate all the necrotic tissue, facilitating the rapid cicatrization of the wound.

The following instruments are necessary: a large, straight bistoury with a blade about 8cm long; a pair of straight scissors; a pair of curved scissors; a dissecting forceps; a forceps with claws, such as that of Museux; a curette of Volkmann, large and strong; two curettes of Simms, one large and one small, with long handles (25cm); a curette of Simms with notched edges, also with a long handle.

■ The operation is performed in the standing position, the horse being restrained solidly against the stall partition, which also protects the operator. For greater convenience, the operator should mount onto a stool in order to have the withers of the animal in a convenient position; a pole ladder or movable partition placed on the other side of the animal prevents it from moving away from the operator.

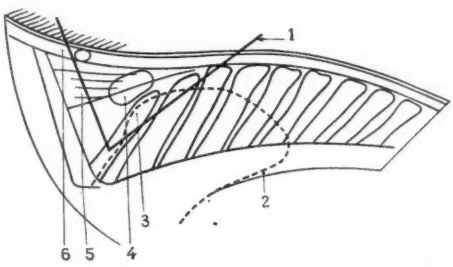
The region over the withers, the shoulders, and the base of the neck should be clipped; the mane should be cut off, at least in the posterior third. The area should be washed with soap, rinsed and dried; then those parts of the shoulders where the pus will be flowing during the following days should be covered with vaseline.

The operation consists of five principal parts:

1. With the bistoury make an incision 20cm long through the skin and the connective tissue, on the median line of the body, from the base of the neck to the third or fourth dorsal spine.

2. With the bistoury inserted vertically to a depth of about 15cm, incise deeply in the center the serous bursa and the cervical ligament. These two incisions are performed from before backward, or *vice versa*, depending upon which side of the animal the operator is standing.

3. Remove the necrotic parts of the cervical ligament and of all the adjacent tissue, with the scissors and the forceps of Museux. Tearing out the necrotic ligaments is always to be preferred, in so far as possible, to cutting them away.



1. Line of incision. 2. Outline of the scapula. 3. Spiny process of the second dorsal vertebra. 4. Serous bursa, point of origin of fistula of the withers. 5. Lamellar portion of the cervical ligament. 6. Funicular portion of the cervical ligament.

4. Scrape the spiny processes of the necrotic second, third and fourth dorsal vertebræ with the curette of Volkmann.

5. A general scraping of the whole wound and particularly of the fistula along the anterior border of the spine of the second dorsal vertebra. This can be effected with the aid of the different models of the curettes of Simms.

The operation ended, the cavity should be thoroughly explored with the hand, in order to be certain of leaving no shreds of necrotic tissue. The wound should be cleansed with boiled water and tamponed firmly with absorbent cotton in order to arrest the hemorrhage from the cut blood vessels. The subcutaneous injection of 20cc of antigangrenous serum under the skin of the neck completes this portion of the treatment.

■ Subsequent treatment is as follows:

The first three days, irrigation with warm, boiled water removes the blood clots formed by the stoppage of the hemorrhage since the previous day. These irrigations should be performed with the aid

of a two-litre bottle and a sterile rubber tube.

By the fourth day, the larger blood clots having been eliminated and the wound no longer bleeding, treatment with the lactic ferments can be begun in the following manner, and repeated each day until healing takes place.

1. Cleanse the wound thoroughly with warm, boiled water as on the first three days.

2. Dry the bottom of the wound with absorbent cotton.

3. Sprinkle in the wound a spoonful of powdered ferment, pushing it to the bottom of the cavity with two or three compresses of sterile gauze, about 30 by 30cm, which are left in place in the different fissures.

Every day the compresses are removed, the wound cleansed, and fresh ferments inserted.

Fifteen days later, the entire wound should be scraped with the aid of the different curettes of Simms, in order to remove the large pieces of necrotic tissue which are being eliminated. Then the dressings should be continued as before, until about 20 days after the last curettage, when the wound should be examined again. The cavity is then red and swollen, and discharging a white, creamy pus, indicating the approach of healing. Sometimes a little incision performed behind the withers, on the median line, will facilitate the removal of a shred of necrotic ligament from the spiny process there, extraction by the initial opening being rendered difficult by its distance, and the daily washing of this cul-de-sac and the implantation of the ferments are also facilitated by this procedure.

Finally, when the shrinkage of the operative wound no longer permits cleansing with the rubber tube nor the dressings with the powder, injections of ampules of soluble lactic ferments made with the aid of a long, hollow probe mounted on a sterile, 10cc syringe, will complete the cicatrization of the lesion.

■ With this operative technique and the powerful action of the lactic ferments, the most serious cases of fistula of the withers require treatment for only 70 to 90 days. Very often healing will be obtained within a much shorter period—40 to 50 days. The perfect cicatrization of the lesion permits the use of the horse in harness as in the past.

This procedure assures the healing of one of the most stubborn lesions known to surgical pathology in a relatively short period and with a small number of surgical interventions (one operation and two curettages). It complies therefore in all points with the essential principles of our surgery as defined so judiciously by Prof. Cadiot, who said in his inaugural lesson, "Veterinary surgery ought to remain judicious in its attempts, simple in its means, quick in its acts, economical in its results."

In this discussion the author advances a combination of internal medication and surgery for the treatment of fistulous withers that gives promise of shortening the time required for recovery under internal treatment and improving the percentage of cures. At the same time, it avoids the evil of extensive mutilation, inherent in the "radical operation" for this condition.

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Thrombosis of the Iliacs

Says a correspondent: "One of my good clients bought a six-year-old gelding recently that goes down every time he is put to work. He breaks down like a case of azoturia but is always apparently well on my arrival. The urine is normal, etc."

At the Galesburg (Ill.) clinic in 1938 an Illinois practitioner reported a similar case in a pacer that "began to slow up in the workouts and now breaks down in less than a quarter of fast work."

But the reason for writing this brief is a quotation from another letter saying: "Now, don't tell me this case is caused by parasites. I held a careful autopsy and found no parasites at all."

In each of these cases, the symptoms were the same: Sweating, great pain, and collapse of a hind leg, coming on after a certain amount of exertion. The older practitioners whose work was mainly among horses, know this disease as "thrombosis of the iliacs." It is an incurable disability due to the blocking of the blood supply of one or both hind legs by a well-organized thrombus of one, two or all of the iliac arteries. While the development of the thrombus is gradual, the attacks beginning at a certain stage of its development come on suddenly with a given amount of work, varying from a mere trot-out at the halter to a fast workout of a furlong or so, depending upon the extent to which the blood stream of these vessels is dammed off. Extreme cases, especially the bilateral ones, go down and struggle much the same as a bad case of azoturia. The main difference, clinically, is the complete recovery from the agony and lameness in an hour or less.

During the past fifteen years or more while the horse stable was overlooked on the way to the cow barn, chicken coop and hog lot, this and other afflictions of horses were forgotten. We know this to be true by the inquiries received from practitioners who came upon the scene during the quiescent period of equine medicine. With perhaps some exceptions, the older practitioners know this quite well even had they not seen such cases. The disease was listed among the troubles to be expected. Although strongyles were not known to be the cause, the disease was recognized on sight, when a practitioner came upon a case. That is to say, while the etiology of the trouble was debatable, its clinical manifestation and pathological anatomy were well understood. All cases were symptomatically analogous and the telltale thrombus could always be found post mortem in the form of a grayish series of concentric rings of organized material extending along a foot or more of one, two or all of the iliac arteries. An illustrated report of a typical case was described in the *American Veterinary Review* (31:89-97; 252-265). While the lesioned vessels such as are shown in the illustrations could always be found post mortem or detected by palpation antemortem, the parasitic origin, although suspected, was an unsettled question until parasitologists, some 30 or more years ago, succeeded in indicting migrating strongyle larvæ as the casual factor. Railliet abroad and Kinsley in this country were the first, we believe, to clarify the etiology by demonstrating the presence of larvæ of *Strongylus armatus* in the lesion. While that cause had long been suspected, the crux was the anatomical difference between iliac and mesenteric thrombosis. If never actually proved, the difference has been explained by the powerful flume of the blood stream at the extremity of the aorta compared with its abrupt diversion at the mesenterics.

As mentioned above, the reason for writing this report is the doubt expressed as to the parasitic nature of the trouble. The answer is that the larvæ responsible for the trouble have long since (possibly years before) disappeared from the locale when the attacks begin to appear.

There is no cure nor palliative treatment. An artery, the endothelieum of which has been destroyed, can never again function as a normal channel for living blood. Even were some miraculous chemical found to dissolve the accumulated detritus, a new thrombus would proceed to develop.—*L. A. Merillat.*

A Fibroma in a Mare

THE subject was an eight-year-old, bay mare, weighing approximately 1,300 pounds. The Polar Fox Company of Worthington, Minnesota, the owner, had purchased this mare from a farmer near there

Fig. 1

Fig. 2

for eight dollars, because of a large fibroma growing on the right hind leg at the level of the hock and slightly below it (Fig. 1).

The former owner claimed that he had been treating the fibroma for the past two years with home remedies and had spent about fifty dollars on blisters and various patent medicines from the drug store, but none of them had ever done any good. The mare could no longer work because the weight of the fibroma interfered with her locomotion, and the farmer decided to sell her to the fox farm to be used as meat for the foxes.

The manager of the fox farm, thinking the mare too good an animal to be fed to the foxes, brought her to the Worthington Veterinary Hospital to find out if anything could be done.

The mare was given 10cc of a 1% solution of procaine hydrochloride epidurally. The hair around the affected part was clipped and shaved, and tincture of iodine was applied to the skin. The surgical area was also infiltrated with a 1% solution of procaine hydrochloride.

The fibroma was ablated; the blood vessels being ligated with linen sutures. Because of the size of the neoplasm the area was left to heal as an open wound, and a bichloride of mercury pack (1:1000) was bandaged rather tightly over the wound.

After-treatment consisted of daily applications of an antiseptic dusting powder.

The weight of the fibroma after ablation was 36 pounds. Microscopically, it had the appearance of fibrous tissue, and laboratory examination confirmed the diagnosis of fibroma.

The second picture of the mare (Fig. 2) was taken two months after the operation and shows how the healing had progressed. The picture also shows her foal, born a short time before.

At the present time the mare, instead of appearing on the foxes' menu, is engaged in hauling feed to them. The only evidence of the operation that remains is a slight scar on the anterior surface of the leg just below the hock.

H. PAUL BOLKS

Hull, Ia.

Chronic Interstitial Pneumonia in a Mule

A 22-year-old, black, molly mule weighing 1,0000 pounds was presented at the veterinary clinic of the Kansas State College for observation September 30, 1938.

History.—A more or less insidious loss of flesh had been noticed by the owner. The first major illness had been noticed about March 5th while plowing for potatoes. Labored breathing and sudden fatigue while doing light work were among the earliest symptoms. In July, 1938, the mule had been treated for parasites with carbon tetrachloride.

Symptoms.—The animal was emaciated and had a dry shaggy coat. Abdominal breathing was marked and respirations were about four times faster than normal. Dry sibilant rales were heard over the anterior dependent part of the lung. No abnormality was detected over the dorsal portion. Heart sounds were irregularly accentuated and the pulse was weak. The animal was very alert, but was reluctant to move. The appetite, which had been intermittently poor, was entirely absent at this time. The temperature remained between 101°F. and 102.6°F. The mucous membranes were a bright pink color. Rectal examination revealed an enlargement anterior to the left kidney which was suspected of being a tumor.

Blood and Urine Analysis.—A blood ex-

amination disclosed 6,607 white cells and 6,690,000 erythrocytes per cubic mm., and 10.7gm hemoglobin per 100cc. Differential white blood count showed only a slightly increased proportion of immature neutrophiles. The urine analysis revealed large amounts of urea crystals.

Destruction of the animal was advised in view of the cachexia and the tentative diagnosis of a prerenal neoplasm.

Post-mortem Findings.—The pericardial sac had 1½ pints of serous exudate and the right side of the heart was hypertrophic.

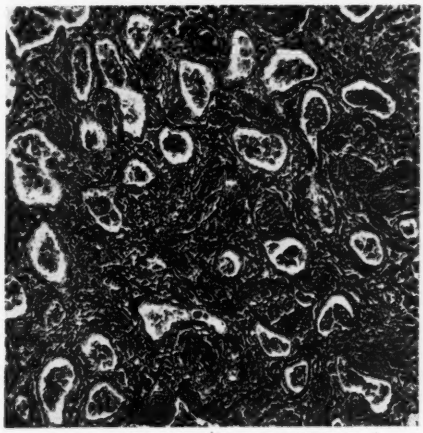
The lungs showed extensive involvement; cone-shaped areas of rubbery consistency along the dorsum of each lung were approximately 24 inches long and eight inches in greatest diameter in the left lung, and seven inches in greatest diameter in the right lung. Sub-serous blood vessels stood out in bold relief against the yellowish background. The cut surface was creamy yellow with a waxy appearance. The cardiac lobe of the right lung also was involved. Microscopically, the most significant change was a diffuse connective tissue proliferation throughout the dorsal part of the lung. The condition apparently had originated around the bronchioles and extended centrifugally into the lobules, causing alveolar obliteration. Giant cells were relatively numerous in the interstitial tissue and in the exudate of the alveolar lumina. Circumscribed areas of lymphocytes were numerous throughout the affected parts of the lungs.

The bronchial lymph nodes were of a greyish-black color, and pigmented particles of coal or stone were found in the parenchyma on microscopic examination.

The spleen was approximately one and one-half times its normal size, the increase apparently being due to hyperplasia. The prerenal enlargement palpated per rectum was probably the enlarged head of the spleen.

The liver and kidneys were apparently normal.

Discussion.—Respired dust particles of various kinds often set up an irritation causing chronic interstitial pneumonia. However, in this case only small amounts of dust were found to be present in the lung. Chronic interstitial pneumonia of the horse or mule is so rare in the United States that it was not considered as a possibility at the time of ante-mortem examination. In Europe the tubercle bacillus is a common cause of chronic interstitial pneumonia in horses. Hutyra, Marek, and Manninger[1] state: "According to Bang and Heidrich, this form of pneumonia has no relation to tuberculosis, but Rabe found tubercle bacilli in one case, and according to Goltz, pulmonary tuberculosis in the horse almost always develops in the form of lardaceous pneumonia and lymphomatosis with a rich bacillary content. It is also stated by Zwick and Zeller that in the horse tuberculosis sometimes appears in the lungs in the form of sarcoma-like nodules with a uniform lardaceous appearance, without caseation or calcification."



Photomicrograph of chronic interstitial pneumonia in a mule.

In view of what European observers have found and the large number of giant cells which were present in this case of chronic interstitial pneumonia, several acid-fast stains were prepared, but no tubercle bacilli could be demonstrated microscopically.

WENDELL L. KANAWYER

Cucamonga, Calif.

[1] Hutyra, F., J. Marek,, and R. Manninger, "Special Pathology and Therapeutics of the Diseases of Domestic Animals," Vol. II, p. 595.

Phosphorus-Deficiency Lameness in Horses

Many cases of cryptogenetic lameness in horses presented to the veterinary clinic of Kansas State College reveal upon blood analysis a deficiency in blood phosphorus. The prevalence of this ailment seems to be associated with the drouth conditions in this section. The normal calcium-phosphorus content of the blood of horses in this vicinity in milligrams per 100cc of whole blood has been found to be: calcium, 9.0 to 11.0; phosphorus, 4.3 to 5.0.

The two following cases are typical of those encountered.

Case No. 1. History.—An eight-year-old, sorrel, gelding cow pony from Tulsa, Okla., was presented to the clinic January 6, 1939, with the history of having been lame in the left hind leg for the past two months.

Symptoms.—The lameness was almost unnoticeable at a walk but more pronounced at a trot. The horse seemed to carry the leg forward and put its heel down normally, but flinched as it came up on the toe. Blocking the plantar nerves had no effect, and there were no abnormalities at the hock joint. The animal's general conformation was good. Calcium-phosphorus analysis of a blood sample revealed: calcium 10.9 and phosphorus 2.38 mg per 100cc of whole blood.

Diagnosis.—Coxitis, probably due to a phosphorus deficiency.

Treatment.—The owner was advised to feed the horse one ounce of steamed bone meal daily, and give complete rest.

Result.—At the end of one month the animal had recovered entirely.

Case No. 2. History.—March 14, a six-year-old, chestnut, thoroughbred gelding was brought to the clinic from Wichita to be treated for lameness in the right hind leg. The horse had been on barley and wheat pasture for the past three months. Prior to that it had been fed oats and prairie hay. It had been lame for three weeks.

Symptoms.—The horse was virtually on three legs, barely touching the tip of the other toe to the ground, and standing with its foot raised off the ground much of the time. There was some atrophy of the muscles over the gluteal and thigh regions. Palpation over the coxofemoral joint produced pain. The rest of the leg was apparently sound. A calcium-phosphorus analysis of a blood sample revealed: calcium 9.59 and phosphorus 3.12mg per 100cc of whole blood.

Diagnosis.—Coxitis, probably the result of a phosphorus-deficient diet.

Treatment.—The horse was admitted to the hospital and given one ounce of sodium iodide in 500cc distilled water, intravenously. The remainder of the treatment consisted of the daily administration of the following:

1. Iodex rubbed into the skin over the coxofemoral articulation, followed by the use of the infra-red ray lamp over the area for one hour.
2. One ounce capsule of steamed bone meal.

Result.—March 31, after 16 days treatment, the horse was discharged from the hospital. Though not completely recovered, it had shown almost daily improvement, bore its full weight on the leg, and handled itself nicely. A blood sample taken March 30 showed calcium 10.09 and phosphorus 3.88mg per 100cc of whole blood.

HOWARD LIEBENGOOD, K.S.C. '39.
Manhattan, Kans.

* * * *

Infection After Castration

In April of this year I was called to see a nice yearling colt that had been castrated one week previously by an empiric. I found the sheath, prepuce and penis enormously swollen, the entire mass being about the size of an ordinary water bucket. It hung down to within about one foot of the ground. There was also a large swelling extending under the belly as far forward as the pectoral region. The colt was very stiff, and had difficulty in getting up after lying down.

I prescribed applications of hot fomentations and astringent lotions, to be applied twice a day. One week later, I found the pendulent condition slightly improved, but the scrotum was swollen to about the size of a half-gallon bucket. I lanced it at the lowest place, liberating at least one quart of pus, and packed the cavity with gauze saturated with a potassium permanganate solution. I left instructions to pull the pack out the next morning and leave it open, and to keep the patient in a clean place. The colt made a slow but complete recovery, and on passing the farm a few days ago, I saw it, now fat and sleek, playing with the other colts.

This case should be a warning against castrating without at least some pretense of sanitation. The colt was owned by a

prosperous farmer who lived at the edge of the town where the empiric who did the castrating lived. At each of my visits a considerable portion of the population was at the farm, each advising the use of his own particular "sure cure" for the condition. The town residents wanted me to lay the blame for the condition on the empiric. This, however, I refused to do, and insisted that it might have happened to anyone; for my policy always has been and always will be to treat the other fellow as I would like him to treat me, regardless of who he is or where I find him.

REMBRANDT MORGAN.

Winfield, W. Va.

Why I Have Never Been Enthused Over Bot Control

The reason that I have never been enthused over the bot control campaign is simply that I am still a believer in the old, old "golden rule," which everyone knows or should know. But the way some of our brother practitioners act sometimes leads us to believe that if they ever knew it, they have long since forgotten it. Possibly it would bear repeating here. It reads "All things whatsoever ye would that men should do to you, do ye even so to them."

We will assume that one of my honest work horses has finished his day's work in the field, has finished his feed of grain, has lain down and rolled, and is now standing in his stall munching contentedly on his hay. He has shown no evidence of any pathological condition, either external or internal. I am not going to allow any man to walk up to him, pull his tongue out, and force down his throat a big pill loaded with "deadly poison."

In the February, 1939, issue of VETERINARY MEDICINE, I read an article on "Parasites of Domestic Animals" by T. W. M. Cameron which stated that all drugs which kill parasites are more or less poisonous to the host, so that their use is attended with considerable risk. The obvious course is to prevent the parasite from entering the body at all.

Personally, I think that Dr. Cameron is right about it. A much better approach to the subject can be made by the application of another old adage: "An ounce of prevention is worth a pound of cure." I have always been glad that I can view all problems from either the farmer's or the veterinarian's standpoint. The reason that I am granted this privilege is obvious; I am both farmer and veterinarian.

REMBRANDT MORGAN.

Winfield, W. Va.

Melanoma in a Mare

The subject was a 10-year-old, 1200-pound, dapple-grey, Percheron mare. A growth about the size of a baseball was situated on the tail, approximately level with the lower commissure of the vulva. The owner stated it was of about four months' duration, and that the animal had lost considerable weight.

The tumor was gangrenous, hemorrhagic and foul-smelling. Because of constant switching of the tail to fight flies, the buttocks had been denuded of hair.

The mare was cast, the operative area infiltrated with a 1% solution of procaine and, while waiting for the procaine to act, the instruments, bandage, etc., were prepared. An incision was made through the skin one-half inch lateral to the base of the growth and around its circumference. The tumor, of firm consistency and of a dense black color, was then peeled from its attachment with the fingers and the hemorrhage stopped with hemostatic forceps. The wound was covered with an antiseptic, healing powder and firmly bandaged.

The owner was instructed to keep the mare in the barn until healing had taken place, to minimize switching of the tail in fighting flies. Healing was prompt and there was no evidence of recurrence or of metastasis when the animal was seen nine months later.

J. B. KEY, K. S. C., '39.

Manhattan, Kans.

Mesothelioma in a Mule

A 12-year-old, brown, horse mule was brought to the veterinary clinic of Kansas State College December 28, 1938. The animal was suffering from ascites, which was most pronounced in the pubic region. According to the owner, the condition had been getting steadily worse for a period of three weeks.

Although apparently normal in other respects when at rest, the animal showed easy fatigue and dyspnea when stimulated. A sample of serous fluid from the peritoneal cavity was straw-colored, and a microscopic examination showed some red blood cells. A tentative diagnosis of internal tumors did not warrant immediate treatment, and the mule was placed under observation.

Mesothelioma in a mule

After two days, a post-mortem examination performed by Dr. L. M. Roderick verified the diagnosis and demonstrated the following unusual and extensive pathological condition.

The thoracic wall was sparsely studded with rounded, pedunculated tumors varying in diameter from 1 to 2cm. The various organs were heavily laden with similar nodular growths of varying size, which interefered mechanically with the functions of the organs. The tumors ranged in type from encapsulated, abscess-like structures to firm, fibrotic growths. Some had the appearance of organized subpleural hematomas or retrograde fibrous tissue.

The lungs were densely studded with soft nodules imbedded in the deep structure and surface areas.

The pericardium showed similar but smaller growths extending from its surface.

The anterior mediastinum was literally full of tumors, the largest of which was a rounded mass, 15cm in diameter, lying on the left anterior ventral wall of the thorax next to the heart. Posterior to the heart was the largest tumor, a mass 15 by 30 by 15cm of firm, fibrotic or connective-tissue consistency.

The myocardium contained a number of small, pale, infarct-like nodules interspersed within its structure.

The abdominal viscera, although not so much affected as the thoracic, also exhibited serious changes.

The liver was normal in size, but showed large, pale, confluent areas. Its surface was spotted with several small, pale, metastatic nodules and throughout the organ was macroscopic evidence of fatty degeneration. Passive congestion was noticeable.

The surface of the kidney was studded with numerous small, white nodules. No other pathological conditions were apparent.

The spleen seemed normal in color and consistency, but was slightly enlarged and contained several nodules 2 to 3mm in size.

The intestinal tract presented a normal appearance. The mesentery, however, contained several rounded, tumorous masses up to 2cm in diameter. The lymph glands were swollen and infiltrated with serous fluid.

Variation in the structure and type of cells as well as the differences in opinion as to the embryogenesis of mesotheliomas have caused considerable difficulty in their classification. "The structure of some may simulate an epithelial growth; in others, connective tissue characteristics may predominate, and it is not unusual that a combination of the two structures may occur within the same tumor. . . .

"In recognition of a tumor derived from mesothelial cells there are several points of

significance. The tumors arise from the pleura, pericardium, or periotoneum. The surface and not the subserous connective tissues give rise to the neoplasm. The tumors are diffuse, usually multiple, and exhibit a tendency to remain localized; metastasis is unusual. The presence of a primary tumor in some other portion of the body should make one extremely cautious in venturing a diagnosis of primary mesothelioma. Metastatic tumors of the serous membranes are not uncommon.[1]"

MURRAY FELDMAN

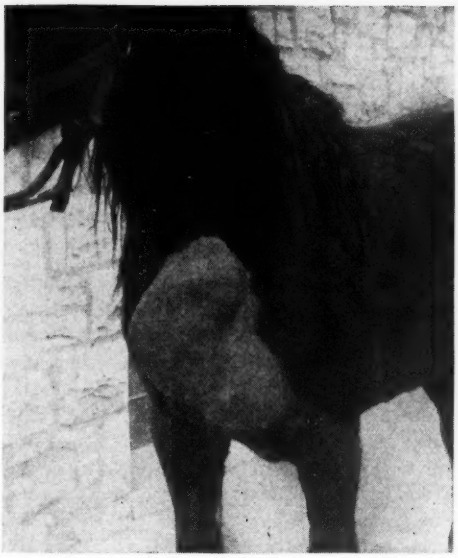
Brooklyn, N. Y.

Enormous Fibroma in a Horse

April 12, 1939 a nine-year-old, black, Percheron mare, in poor condition, was presented at the veterinary clinic of Kansas State College with a large swelling on the left side of the neck, just dorsal to the pectoral muscles. The tumor had first appeared over two years previously as a small growth. Apparently its growth stopped until the mare foaled soon afterwards. It had grown continuously ever since. There was no history of a collar bruise or other injury. Rectal palpation did not reveal any internal metastatic foci.

On April 13th the tumor was removed surgically under local anesthesia; its removal was accompanied by considerable hemorrhage. The wound was flushed daily with a 1% solution of potassium permanganate and at frequent intervals was sprayed with pyoktanin blue. Recovery was uneventful.

On palpation the tumefaction was smooth on the surface, firm in consistency, but not hard. It was irregular in outline and weighed 14.96 pounds. Its greatest dimensions were 15 by 9 by 4¾ inches. On the cut surface it appeared yellowish-white in color, dry, and not very vascular. The structure appeared as bundles of connective tissue, some cut in cross-section and other longitudinally. On microscopic examination the tumor was diagnosed as a fibroma, composed mostly of collagenous fibers. There was a slight tendency to anaplasia.



The fibroma had attained enormous proportions.

ROBERT J. LEE, K.S.C. '39

Manhattan, Kans.

[1] Feldman, William H., 1932. Neoplasms of Domesticated Animals.

Equine Encephalomyelitis Can Be Cured

A recent writer in VETERINARY MEDICINE stated that sleeping sickness in horses is not curable. I treated a few cases in 1936, 87 cases in 1937, and 15 cases in 1938; then I took the disease myself. Of the whole number, including myself (for I took the same treatment), I lost only five horses—4%. Granted I didn't treat many, but then I am 86 years old; I made three or four calls on each case and was stopped long before the outbreak was over last summer by contracting the disease myself. Perhaps because of my age I had a serious time of it and am still weak from its effects. Yes, it pays well to treat encephalomyelitis. It can be cured.

B. C. TAYLOR.

Hillsboro, N. Dak.

Alfalfa Meal as Supplement to Corn in the rations of Artificially Depleted Young Pigs

By L. H. SCHWARTE and D. F. EVELETH, Ames, Iowa
Veterinary Research Institute, Iowa State College

STUNTED, unthrifty and generally depleted pigs are frequently produced by feeding rations restricted entirely to cereals. Where such feeding methods are practiced the pigs are usually confined to dry lots or stabled. In certain cases attempts to balance the rations with mineral mixtures are made. Failure to grow, stiffness and death from rather obscure causes frequently occur in such herds.

In experiments conducted at this and other laboratories, it has been found possible to raise young swine to marketable size in the absence of sunshine. To raise pigs satisfactorily under such artificial conditions, it is necessary to have a complete ration. The vitamin D requirement for swine is quite low. In many instances the ration is otherwise satisfactory. The value of pasture or alfalfa meal in swine nutrition is generally recognized.

The experiments described here were conducted to obtain additional information as to the value of alfalfa meal when used as a supplement to a corn-mineral ration fed to artificially depleted young swine confined to barns during the course of the experimental study. Normal, young swine were selected from the Institute herd and stabled for about one month. During this period only corn and water were fed. They were tail-bled periodically in order to stunt their growth and to deplete their reserves of blood-forming elements. Our object was to produce a condition similar to that encountered in the field. The experimental swine selected were active and in good physical condition. When growth was arrested, as indicated by loss of weight and a decrease in hemoglobin values to a point below 10gm per 100cc of blood, the animals were divided into three groups and fed the rations listed in Table I.

TABLE I.—EXPERIMENTAL RATIONS

Ration Number	I	II	III
Yellow corn	96.0%	86.5%	77.0%
Bone meal	3.0%	2.5%	2.0%
Sodium chloride	1.0%	1.0%	1.0%
Alfalfa meal	—	10.0%	20.0%

To the daily ration of each pig was

TABLE II.—HEMOGLOBIN, SERUM PROTEIN AND GROWTH CHANGES DURING EXPERIMENTAL PERIOD

		Hemoglobin (Grams per 100cc)		Serum Protein (Per cent)		Weight (Pounds)	
	Date	9/7/38	11/9/38	9/7/38	11/9/38	9/7/38	11/9/38
Ration I	Pig No. 29	9.8	10.6	7.57	7.19	92	122
	Pig No. 30	8.3	11.5	6.73	6.70	98	110
	Pig No. 33	8.8	12.0	6.81	6.60	83	101
	Average	8.9	11.4	7.04	6.83	91	111
	Aver. change	....	2.7	.....	-.21	....	20
Ration II.	Pig No. 28	9.2	10.6	7.62	7.23	92	128
	Pig No. 35	5.8	9.2	7.66	7.00	69	87
	Pig No. 39	9.2	12.6	7.66	7.15	109	161
	Average	8.1	10.8	7.64	7.12	90	125
	Aver. change	....	2.7	.....	-.53	....	35.3
Ration III	Pig No. 31	8.6	10.6	7.07	6.66	85	125
	Pig No. 32	8.2	10.4	6.85	6.24	81	122
	Pig No. 38	8.5	11.0	7.11	7.19	111	151
	Average	8.4	10.7	7.01	6.69	92	133
	Aver. change	....	2.3	.....	-.32	....	40.3

added 1cc of a ferric chloride and copper sulphate solution containing 0.2gm $FeCl_3$ $6H_2O$ and 0.01gm $CuSO_4$ $5H_2O$. Water was allowed ad libitum. The animals were

TABLE III—Erythrocyte and Leucocyte Changes During the Experimental Period

		Erythrocytes in Millions		Leucocytes in Thousands	
	Date	9/7/38	11/9/38	9/7/38	11/9/38
Ration I	Pig No. 29....6.20	7.20		22.4	18.8
	Pig No. 30....4.80	7.20		12.2	18.4
	Pig No. 33....4.60	7.20		14.0	18.6
	Average.....5.20	7.20		16.2	17.6
	Av. change....	2.0			2.4
Ration II	Pig No. 28....5.55	7.20		17.2	14.8
	Pig No. 35....6.60	5.95		14.4	14.8
	Pig No. 39....6.05	7.55		15.0	20.6
	Average.....6.07	6.90		15.5	16.4
	Av. change....	0.83			0.9
Ration III	Pig No. 31....5.40	7.45		18.4	21.2
	Pig No. 32....5.50	7.65		22.0	17.0
	Pig No. 38....6.50	7.25		12.0	18.0
	Average.....5.80	7.45		17.5	18.7
	Av. Change....	1.65			1.2

housed in individual, concrete pens with no bedding.

The pigs were weighed at weekly intervals and at the same time blood samples were drawn for hemoglobin and serum protein determinations as well as erythrocyte and leucocyte counts. The depletion level and final values for the various constituents are summarized in Tables II and III.

Chart I shows the trends for the same constituents on one individual considered typical for each of the three groups of experimental animals.

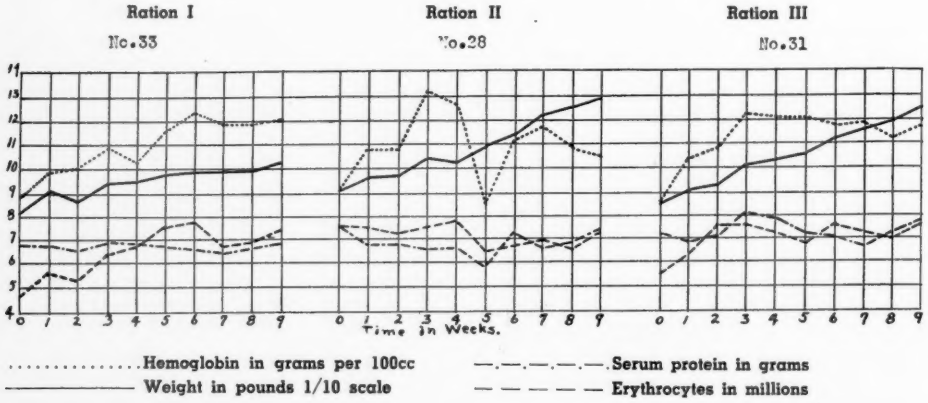
The appearance of the animals after the depletion period was very similar to that of animals encountered under field conditions. They were unthrifty and stunted; the hair coats were roughened and pronounced emaciation was evident. The animals frequently showed evidence of weakness and depletion by labored respiration and fatigue after relatively mild exercise. The group of pigs fed the alfalfa meal supplement refused to eat the shelled corn-alfalfa meal mixture at first, but consumed it when the corn was finely ground and mixed with the alfalfa.

Approximately one month after the beginning of the experimental feeding, several of the pigs showed evidence of lameness. This appeared first in group I, but

There are several points of practical importance which are clearly illustrated in this investigation. The frequency with which the diagnostician encounters pigs that are stunted and emaciated shows the high incidence of malnutrition in young swine. It is now the general policy to recommend pasture or alfalfa meal. Both of these procedures have their place in a rational therapy, but may be insufficient. If the young, stunted pigs are to be confined to pens, such rations as were fed in this investigation will be inadequate. Mature animals allowed access to sunlight usually keep in good flesh on rations composed of alfalfa and grain. Younger animals need additional proteins and vitamins. The quantity of essential nutrients which swine obtain in rooting is probably larger than is generally appreciated. Swine have been observed eating earth worms, grasshoppers and other forms of life which they procure from the soil. The supplementary value of this additional food may determine the difference between an adequate and a deficient ration.

Under the conditions of these experiments it was shown that all the rations fed were inadequate. Many stockmen confine the pigs in barns during the winter and feed a low protein ration. The growth rate is always slow and various forms of malnutrition become apparent. Where such conditions exist, alfalfa meal may be too low in proteins and vitamins to cause recovery of the animals. Treatment under such conditions would be the inclusion of tankage or other animal protein in the ration. If the pigs do not have access to sunshine, it may be advisable to add cod-liver oil also.

CHART I. GROWTH, ERYTHROCYTES, HEMOGLOBIN AND SERUM PROTEINS OF REPRESENTATIVE ANIMALS



was also observed in groups II and III. The animals in group I showed a definite loss of appetite, eating moderately at irregular intervals. Loss of appetite was not noticed in any of the animals in groups II and III, with the exception of pig No. 35. Weakening of the hind legs was an outstanding symptom in all animals except pigs Nos. 38 and 39. These animals were much larger than the others and made much better growth during the experiment.

The initial size of the pigs undoubtedly played an important part in determining the response to the dietary regime. Pig No. 35 became very weak in the hind legs, the hair coat was rough and growth slow. The general debility and stance of this pig are illustrated in Figure 1.

Figure 2 shows pigs Nos. 33 and 32 from groups I and III respectively. The beneficial effects of alfalfa meal are not clearly shown, although the growth rate, hemoglobin and general appearance indicate that pig No. 32 was in a better nutritional condition than its litter mate, No. 33.

The skins of all the pigs showed a scaly eczema and in certain cases there were definite areas of hemorrhage in the skin. These lesions are apparently due to a deficiency of a factor or factors in the vitamin B complex, possibly nicotinic acid.

The experiment was discontinued after nine weeks. Samples of blood were obtained from eight pigs for certain chemical analyses. The whole blood glutathione and serum inorganic phosphorus, calcium and magnesium are shown in Table IV.

TABLE IV—Chemical Analysis of Blood in Milligrams Per Cent

		Whole Blood Glutathione	Serum Inorganic Phosphorus	Serum Calcium	Serum Magnesium
Ration I	Pig No. 30	43.0	7.92	10.0	2.9
	Pig No. 33	48.5	7.20	9.7	2.9
	Average	45.7	7.56	9.9	2.9
Ration II	Pig No. 28	39.9	8.70	10.5	2.7
	Pig No. 35	46.5	6.50	9.7	3.2
	Pig No. 39	39.9	7.17	10.6	2.7
	Average	42.1	7.49	10.2	2.8
Ration III	Pig No.31	39.6	7.51	8.8	2.4
	Pig No. 32	40.8	7.11	10.4	2.7
	Pig No. 38	39.9	8.00	9.7	2.6
	Average	40.1	7.53	9.6	2.6

The glutathione concentration is higher in the blood of the animals which made the least growth during the experimental period. These values are not significantly different from those obtained in other studies. It is apparent that ration I contained adequate amounts of the precursors for glutathione formation. The serum inorganic phosphorus of all animals was slightly low. The serum calcium was low in all cases. This may have been due in part to a deficiency in vitamin D or to some other unknown factor.

The serum magnesium was higher in

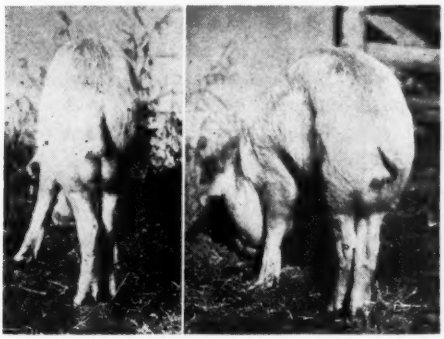
group I than in either of the other groups, with the exception of pig No. 35. The serum calcium and magnesium appear to vary in the same general direction. There is very

Fig. 1

little difference in the calcium content of the three rations, but there is slightly more magnesium in ration III than in ration I. It may be that certain factors present in alfalfa alter the calcium-to-magnesium relation in the serum. As shown in table II, the serum proteins were low in all of the animals. It is not an unusual situation to find low serum calcium with low serum proteins.

There are several possibilities in considering the limiting factors in ration III. It is doubtful that any serious mineral deficiency exists. Vitamin A is adequately supplied. Swine do not require an exogenous source of vitamin C. This leaves a possible amino acid deficiency or a possible deficiency in some parts of the vitamin B complex. Swine fed rations of corn supplemented with minerals, cod-liver oil and 4% dried yeast make better growth records than did the animals on ration III. Yeast contains a very excellent body building protein as well as many of the water-soluble vitamins. The data obtained in these experiments have shown that yellow corn and alfalfa meal supplemented with minerals do not constitute an adequate ration for young, growing swine. The two larger animals, Nos. 38 and 39, made quite substantial gains and at no time did they show the degree of malnutrition that was shown by the smaller animals.

It is particularly noticeable that the pigs on ration I gained very little in weight but did show considerable hemoglobin regeneration. The rate of hemoglobin regeneration, as shown in Chart I, was slower in pig No. 33 than in either Nos. 28 or 31. The pigs on rations II and III, however, grew more, and with increasing weight and



No. 33 No. 32

Fig. 2

development there was a tendency for the hemoglobin to decrease. The progressive decline in serum proteins shown in all pigs of these groups suggest a need of increased protein in all three rations.

Summary

Rations composed of corn and minerals with 10 or 20% alfalfa meal supplements are inadequate to support normal growth and produce blood regeneration in young pigs artificially depleted by hemorrhage.

In these groups of experimental animals there was no close correlation between growth and development on the one hand, and the variations which occurred in the blood constituents on the other.

In the field, where unthrifty and generally depleted young pigs have been encountered, the addition of tankage or skimmed milk to the inadequate ration has usually given satisfactory results. Dried yeast has been shown to be valuable as a supplement to certain deficient rations, but the cost of feeding large quantities of this product is a factor to be considered.

Swine Practice Problems*

Question.—Are so-called button ulcers indicative of cholera?

Answer.—It is generally conceded that the button ulcer is not a lesion of hog cholera. Some practitioners have stated that the administration of anti-hog cholera serum and virus to swine in which button ulcers occur, frequently result disastrously, thus indicating that the button ulcer is probably a complication rather than a lesion of the filterable virus.

Question.—Does an extensive infestation of swine with Oesophagostomum dentatum seriously damage the hog?

Answer.—The damage produced depends upon the extent of the involvement. According to many reports, these parasites are not excessively prevalent and the amount of direct damage done by them is probably a minor factor; however, the injury of the intestinal mucosa resulting from their attack predisposes to enteric disorders. There is no known, successful method of eliminating the parasite when it is encysted in the intestinal mucosa.

Question.—Is there any relationship between infectious stomatitis in pigs and swine pox?

Answer.—Doctor Hastings of Illinois believes there is a relationship. He has observed herds of swine that had an attack of stomatitis and recovered and some time later were exposed to pox without developing the disease.

Question.—What is the usual source of Brucella suis in swine?

Answer.—Infection is usually from swine. However, the fact should not be overlooked that *Brucella suis* may also infect cattle.

Question.—Does Brucella suis become generalized in swine?

Answer.—The tendency of *Brucella suis* to generalization is much greater than is the tendency of *Brucella abortus* to affect other than the genital system; however, *Brucella suis* is usually more or less localized in the joints, lymph glands, mammary glands, etc.

Question.—What is the average minimum dose of the average commercial hog cholera virus necessary to produce immunity?

Answer.—The quantity of virus is of less importance than is its virulency in producing an active, acquired immunity. A small dose (½ to 1cc) of virulent virus will produce as solid and as lasting immunity as will 10 or even 20cc. Regardless of whether 1cc, 4cc, 10cc, or 20cc of virulent virus is used, the same dosage of serum will suffice. If the virus is of low virulence, regardless of the dosage used, the immunity will not be solid or permanent. Commercial virus when properly handled in the field and if used before the expiration date is virulent and usually from 2 to 4cc is amply sufficient. A less quantity could be used with satisfactory results, providing it was all absorbed.

Question.—Does a dose of serum larger than the minimum dosage required decrease the length of immunity?

Answer.—No. It is generally conceded that an active, acquired immunity to hog cholera is of life duration, provided the animal in question has been immunized after the baby pig stage. An increased dosage of serum does not interfere with the production of an active immunity. Therefore, an excess dosage of serum does not decrease the duration of the immunity.

Question.—Does 60cc of serum and 2cc of virus produce less immunity in a 50-pound normal pig than 28cc of serum and 2cc of virus?

Answer.—No.

Question.—Is it possible to give too much serum, thus offsetting the reaction to the virus?

Answer.—No. An immunity of the same degree and duration will be produced in a 50-pound pig by the injection of 60cc of serum and 2cc of virus as is produced by 28cc of serum and 2cc of virus, provided the virus is of the same virulency in both cases, and provided further that the 60cc of serum and 28cc of serum are of the same potency, and that the 28cc of serum is sufficient dosage.

* Questions and answers from a meeting of the Southeast Veterinary Association, May 3, 1939, by A. T. Kinsley.

Question.—Do you consider it an unwise practice to overdose pigs with serum in routine vaccination?

Answer.—The standardization of virus and serum on the basis of definite units of virulency and potency has not been accomplished and until such time as the resistance of the pig can be determined and the standardization of virus and serum can be accomplished, it will be advisable to give an ample dosage of serum. The only objection to the overdosage of serum would be the added expense, and at the present price of serum, the additional expense is nominal. An overdose of serum is good insurance against trouble.

Question.—What are the symptoms of swine Brucellosis in a barrow?

Answer.—Porcine Brucellosis occurs most frequently in sows and primarily involves the genital organs. Arthritis associated with *Brucella abortus* is of common occurrence in sows, boars and barrows. Thus, it is probable that a barrow with Brucellosis would be affected only by arthritis.

Question.—What makes old sows dry up in milk production following farrowing, and do they ever come back into milk production?

Answer.—The specific cause of agalactia in sows has not been determined. It is probably the result of some disturbance in ovarian or uterine functioning that unbalances the internal secretion that stimulates mammary activity. Agalactia usually occurs within a week or ten days after farrowing.

Some cases of agalactia respond favorably and rather promptly following the feeding of a barley mash that has slightly fermented. Other cases respond when given maltine. More recently, the use of ovarian placental and uterine tissue and tissue products has been advocated. An occasional sow recovers by this method of treatment. A few recover without treatment.

Question.—Is it advisable to give anti-erysipelas serum in connection with vaccination of hogs with serum and virus, if erysipelas is suspected?

Answer.—Yes.

Question.—What is the trouble with hogs that eat straw, and what causes pigs to eat their bedding?

Answer.—The eating of any substance other than feed can be caused merely by hunger due to an insufficiency of feed. Depravity of appetite (pica) may be caused by deficiency of some essential ingredient or ingredients in the diet, indigestion, or parasitism. In other cases, it may be classified as a habit or vice. Small pigs sometimes form a habit of picking up straw or bedding.

Question.—What are the symptoms and lesions of swine-pox? Do swine-pox and swine erysipelas ever occur in the same herd?

Answer.—Swine-pox of a mild type has been prevalent in swine in the corn belt for several years. The malady was until recently of such a mild type that it frequently passed unnoticed. In a few instances where serum and virus were used during the incubation stage of pox, some difficulty followed.

Swine pox is quite infectious, 50 to 80% of the herd usually becoming affected. It is caused by a filterable virus, and is manifested by a fever, dullness, inappetence, weakness and stiff gait, and within two to four days, the development of a circumscribed eruption. This eruption occurs primarily on the venter surface of the abdomen, and the inner side of the thighs; in some cases, the major portion of the surface of the body may be involved. The successive changes of the cutaneous eruption of swine pox are usually not as distinct as marked variolas. The vesicles are very small. Umbilical pustules have not been observed in swine pox.

The diagnosis of uncomplicated swine pox is dependent upon the identification of the cutaneous eruption. The simultaneous occurrence of swine pox and erysipelas may result in a symptom complex that may be misleading.

Question.—Can pigs suckling cholera-immune sows contract hog cholera?

Answer.—Pigs farrowed by immune sows are immune, or at least have an increased

resistance to cholera at birth. This congenital resistance is low, and gradually disappears entirely by weaning time or shortly thereafter.

Question.—Can pigs suckling cholera-immune sows be given lifelong immunity by the use of serum and virus?

Answer.—The answer to this question is dependent upon the condition of the pigs, but according to the experience of practitioners, the simultaneous vaccination of suckling pigs less than six or eight weeks of age does not uniformly produce a lasting immunity. In other words, the age of the pigs is a factor that should be given consideration in routine vaccination. We do not believe it advisable to administer serum and virus to pigs that are less than eight weeks of age. The best results, in our opinion, are obtained when pigs are vaccinated two weeks or longer after weaning. Unless it is necessary to treat actual infection, it is our judgment that pigs less than seven weeks of age are entirely too young to treat with serum and virus, if good results are to be expected. It should be noted, however, some experienced practitioners do not agree with this view.

Multiple Hernia in a Pig

A two-month-old, Hampshire pig was brought to the veterinary clinic of Kansas State College for treatment for an umbilical hernia. The area was bathed, shaved, and procaine infiltration anesthesia was performed. The sac, three inches in diameter, was then swabbed with alcoholic sublimate and incised. Two fingers were inserted into the incision to separate the skin and peritoneum before pushing the peritoneal sac, with its contents of intestine and omentum, back into the abdominal cavity. The separation was more difficult than expected, so the skin incision was enlarged. At this point a second peritoneal sac unexpectedly appeared, and further exploration revealed three more. They ranged in size from that of a pea to that of a walnut, each with its own hernial ring, prolapsed intestine and omentum. These five separate prolapses, each definitely separated at their hernial rings by one-half inch or more of abdominal wall, were covered by a single skin sac. The skin and peritoneum were separated. The usual procedure of suturing across the hernial ring after reduction was modified, one continuous suture being used to span the whole area. The five prolapsed sacs were replaced one at a time and the suture made to close each ring successively till all five rings were buried under the one suture line. The skin incision was closed with a mattress suture.

ANTHONY BURDO, K.S.C. '39
Manhattan, Kans.

Lameness in Lambs

Some information is sought relative to the loss of lambs in flock of some 300. About 100 have been marketed and the remaining 200 are two, three and four months of age. There has been some trouble with these lambs for about a month. They were the progeny of ewes purchased in Colorado in the fall of 1938. The ewes were given copper sulphate-nicotine treatment in the spring and there has been no evidence of stomach worms in either the ewes or lambs.

Lameness and unthriftiness are practically the only symptoms that have been evident. On examination it was found that the lameness was associated with swelling and sensitiveness involving one or more joints in affected lambs.—*E.A.G.*, Kans.

Comment.—There has been an imbalance in minerals such as calcium and phosphorus, and also a deficiency in vitamins in much of the feed stuffs raised in this section of the country the past few years.

Bearing this in mind, the symptoms you have described are suggestive of rickets, which is manifested by enlargements, particularly of the joints. This malady is usually not difficult to prevent and control by the administration of cod-liver oil followed by the feeding of bone meal.

Another possibility is swine erysipeles, to which lambs are susceptible. Thus, it would be advisable to have a laboratory test of some of the involved joints made. Unfortunately there is no satisfactory treatment for swine erysipelas.—*A.T.K.*

Technique for Reducing Impaction of the Crop in Birds

Obstruction and impaction of the crop are common in birds. The usual history includes overfeeding on long grasses and grains, with an insufficient water intake. Among the less common causes are the excessive ingestion of pulpy foods, large food particles and foreign bodies.

The usual symptoms of crop impaction are a noticeable increase in the size of the crop, with a loss of normal tone and appetite. If the condition persists, inanition with fermentation, souring, and putrefaction of the crop contents occurs, resulting in acute catarrhal ingluvitis and absorption of the toxic products formed. Rarely the crop reaches such size that it ruptures or causes asphyxia by tracheal pressure. Death usually results from starvation.

Surgical treatment has the disadvantage of improper healing resulting from adhesions, cannibalism and infection.

A non-surgical method of reducing such impactions which has given good results is that used by Dr. W. W. Thompson. Reduction is accomplished by irrigating with the aid of two glass tubes, the larger 12 inches long, with an inside diameter of one-half inch; the smaller, 18 inches long with a diameter of 3/16 inch.

Procedure.—An assistant holds the bird while the mouth is opened and the neck is extended to allow passage of the straight tube. The large tube is then passed into the crop by way of the mouth and gullet. The width of the mandibular articulations is the factor limiting the diameter of the tube. The smaller tube, connected to a gravity flow enema stand, is then passed into the crop through the larger tube. The bird is then suspended head down and the impacted mass is broken up by external massage, gentle probing with the end of the small tube, and irrigation. The food particles pass out in the space between the two tubes. The small tube may be removed and, by external pressure on the crop, the larger particles may be forced out.

Irrigation without the use of the tube often results fatally due to asphyxiation by occlusion of the tracheal opening with food particles.

After the crop is emptied, it is flushed with a 5% solution of sodium bicarbonate to reduce acidity and aid in restoring normal tone to the organ.

Aftercare consists of a liquid or semi-solid diet for a few days.

A. M. HUTTON

St. Joseph, Mo.

Vitamin B Deficiency in a Canary

March 31, 1939, a male, German, roller canary was presented at the veterinary clinic of the Kansas State College showing excessive nervousness.

The bird had stopped singing and gradually become less active for about two weeks previous to the time it was brought to the hospital, and had been very inactive during the latter week. The feathers had been coming out, and the bird picked at its toes a great deal. When anyone approached the cage, the bird became very excited, fluttered into the corner, and finally fell to the floor. The last two days before the bird was presented at the hospital, it was observed to fall to the floor of the cage, flutter violently, jerk its head straight back, and gasp for air.

The diet had consisted of a patented brand of birdseed, inside leaves of head lettuce, and fresh water daily.

A diagnosis of vitamin B deficiency was made on the basis of the very obvious nervous symptoms, and a history which showed the feeding of polished seeds and inside lettuce leaves, both of which are likely to be very low in vitamin B.

The owner was advised to feed haliver oil, two or three drops three times daily, leaf lettuce, and hard boiled egg in addition to birdseed.

The bird showed less nervousness, and on the fourth day of this treatment, began to sing. After two weeks of this diet, recovery appeared to be complete.

L. R. MORTON, K.S.C. '39

Manhattan, Kans.

The Origin and Importance of the Goat

By DARRELL S. STEELE, Treynor, Iowa

THE milk goat industry is in its infancy in the United States. However, the goat is adapted to our country, and the industry should become more important as we become better acquainted with the advantages of raising this species. For this reason, the veterinarian should acquaint himself with some of the more important breeds of goats and their diseases.

■ The goat is one of the most ancient of domestic animals. Most authorities agree that the numerous varieties are descended from the Persian wild goat, *Capra hircus ægagrus*, a species common in Asia Minor. Just when the goat was first introduced into Europe is unknown, but remains of goats have been found among the ruins of early European races.

Records of early settlements in Virginia and New England indicate that milk goats were brought to this country by Captain John Smith and Lord Delaware. Goat raising was of great importance to the early settlers, but gradually declined after the middle of the 17th century.

About 30 years ago, there was a renewal of interest in goat raising in the United States. Prior to 1904 there were scarcely any purebred Swiss goats in this country; records reveal but one importation of four animals in 1893. In 1904, ten Saanen and 16 Toggenburg goats were brought to the United States, and these were followed by many more importations. These Swiss goats have provided the basis for the development and improvement of the milk goats in this country. The most important breeds in the United States at present are the Angora, Saanen, Toggenburg, Nubian, Maltese, Alpine, and mongrel.

The browsing habits of the Angora are useful in clearing land. The carcass furnishes good meat, and the mohair is in good demand for important fabric specialties. Also, the skin can be made into morocco leather.

Among the milk goats, the principal producers are the Saanen, Toggenburg, Nubian, Maltese, and Alpine. The mongrel goat is valuable as a source of milk supply, and is also used for clearing off land.

■ The milk goat has many advantages over the cow. It can be kept where it is impossible to keep a cow. Many city dwellers find it possible to keep a goat or two in their back yards, whereas cows require more grazing land. A good producer will supply sufficient milk for the average family, and the milk from the goat is as wholesome and nutritious as that from the cow. In localities where an adequate supply of milk is not available, and the keeping of cows is impracticable, good milk goats can contribute materially to the improvement of the diet, especially among families of low income. Goats' milk is more easily digested than cows' milk, as it has smaller fat globules and softer curds, thus making it ideal for infants, invalids, and persons suffering from ulcers of the stomach. Goats are rarely affected with tuberculosis, which is another point in their favor. In addition, the meat is palatable and nutritious.

One of the first questions raised concerning the milk goat is that of production. The average milker produces about two quarts of milk a day, while a production of three quarts is considered excellent. The retail price of goats' milk varies from 10c to 50c a quart. Properly handled, it has no disagreeable odor or flavor. The principal sources of bad odor or flavor are: particles of dirt or hair that fall into the milk during milking; keeping the does in unclean quarters; milking in a barn or pen near the bucks. Bucks should never be permitted to be with does, except during the breeding season, and then they should be left together for only a short time, as the strong odor of the buck, transferred to the doe by contact, is quickly absorbed by the warm milk.

At the New York Agricultural Experiment Station, with a mixed herd of goats, it was found that the percentage of fat in goats' milk varied from 3.2% to 4.4%, the solids not fat ranged from 7.72% to 8.61%, and the total solids from 11.4% to 11.9%.

A Typical Case of "Swell Head" in a Goat.

A chemical study of goats' milk indicated no essential difference between the constitution of its casein and that of cows' milk. Certain differences were observed in the ash, as compared to both cows' milk and human milk, but the effects of these differences have not been fully studied. According to recent analyses of the milk of the herd belonging to the Bureau of Animal Industry of the U. S. Department of Agriculture, there is no significant difference in the calcium, phosphorus, iron, and copper content between goats' milk and cows' milk. A series of studies conducted by the bureau in coöperation with Johns Hopkins University, on the bacteriological, physical, and nutritive properties of goats' milk as compared with cows' milk, may be summarized as follows: Normal infants were fed milk from both goats and cows, with no essential differences noted. In studying the vitamin content, it was found that neither milk possessed marked superiority. The cows' milk was higher in vitamin A, while goats' milk contained more vitamins B and G. Vitamin C was found to be low in both milks. The vitamin D content was approximately the same. Studies of bacteria in goats' milk showed 48 out of 82 aseptically drawn samples to be free of organisms. Bacterial counts of less than 1,000 organisms per cubic centimeter were commonly found. Goats' milk was found to have a much softer curd and smaller fat globules than cows' milk. It was also recognized that idiosyncrasies of individuals for one milk or another exist; there are, however, no cases on record in which children were unable to utilize goats' milk.

■ Although considered very healthy, goats are not entirely free from disease. In Federal meat inspection, the cause of most of the condemnations for goats, on both antemortem and post-mortem inspections, is emaciation. Emaciation may be due to any one of a combination of several conditions or diseases, such as stomach worms, flukes, tapeworms, lice, and abortion. The veterinarian should be prepared to diagnose and treat these. He may also be called upon for surgery, such as debleating, dehorning and castrating; as well as for treatment of such ailments, as foot-rot, sore teats, infectious pneumonia, contagious ecthyma, "swell head," diarrhea and mastitis. In general, goats are less susceptible to disease than sheep, but the two species are so closely allied that the treatment of disease is much the same.

When using goats' milk, it must not be forgotten that the goat is a harborer of *Brucella melitensis*, which causes abortion in goats and Malta fever in man. For this reason, it is advisable to have them tested for brucellosis. The test is the same as that for Bang's disease.

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The Effect of Captivity on Wild Animals

By I. BERKOWITZ, Manhattan, Kansas
Kansas State College, Class of 1939

Translocation of wild fauna from the natural state to one of captivity, with its necessarily concomitant artificiality of varying degree, is invariably fraught with both physical and mental disarrangements. Sudden change of climate, environment, diet and habits are bound to react profoundly on an animal that has been reared in the wild and suddenly thrust into unaccustomed surroundings in close association with man (his instinctive enemy). Psychotic complexes such as anxiety, fear, nostalgia and unsatisfied sex urge brought about by close confinement are conducive to mental conditions perhaps not unlike those prevailing in persons spoken of as not adjusted to our own complex and perplexing society.

The matter of diet offers the greatest problem in maintaining wild animals in captivity. An attempt is made to simulate the natural diet as closely as practical but this is often very divergent. For instance, the lion is accustomed to seizing his prey and ripping it open for the abdominal viscera (to him the most enjoyable part of the meal), but under caged conditions he needs must subsist on a diet of muscle and bone with monotonous regularity. It is not surprising, in view of this, to note that gastroenteric disorders are the most common ailments of caged wild animals. On the other hand, our large zoölogical population is accounted for by the fact that many of these animals take to their new diet and thrive on it.

Climatic differences are fairly easily dealt with, both because this condition can be corrected artificially and because most animals show a surprising adaptability to the rigors of weather. Here in Manhattan, at the city zoo, several rhesus monkeys have been confined in an open pen all winter long, exposed to all kinds of climatic conditions, and doing well, having responded to the cold by growing extra-long coats.

The often peculiar behavior and seemingly mental aberrations of confined animals make fascinating, speculative study. The neurotic rats of recent fame (produced by psychologist Norman R. F. Maier of the University of Michigan) show what systematic frustration can do to an animal. These animals were conditioned to obtain

A Pair of Silver Foxes

food by jumping at a certain marked card and knocking it down. If they jumped at a wrong card it would not fall down but instead the animal would receive a bump on the nose and no food. The rats were apparently driven insane when, guided by habit, they persisted in jumping at the card that formerly rewarded them by a meal but which was now stable so that it did not topple when jumped at.

Some interesting observations noted by psychologists on animal behavior in other experiments on rats are that *hunger* and *thirst* are the two most potent activating stimuli. These are closely followed by sex. The anomalous behavior of animals thwarted in this powerful urge is not to be wondered at, in the light of the behavior of humans under similar circumstances, who through perversion resort to such forms of sex expression as ipsation, pederasty, sadism and masochism. In animals such perverted acts as coprophagy, eating of young by the mother, the killing of the young or the female by the male and auto-mutilation are fairly common but certainly enigmatic. These phenomena probably do not exist in nature to any great extent as it is thought that enforced idleness and confinement bring these about. Animals in the wild state are too much

occupied with wresting sustenance from and warding off the onslaughts of nature.

Animals as a rule are social and usually enjoy the company of their own kind. However, they often show affection for one of a different race and this is brought out most prominently in the man-dog relationship. Dogs have been known to develop an "affection" psychosis, which may proceed to marasmus and death, when de-

South American Chinchilla

prived of the companionship of their master. Similarly, animals in captivity have succumbed when deprived of a mate or other companion through death or removal.

Nostalgia is perhaps one of the most common forms of mental disease of the newly-captive. The radical environmental change from a state of freedom in verdant nature to the close confines of a gloomy pen with no possibility of escape must play havoc with the mind of a caged animal. That the instinctive desire for home is strong in many animals can hardly be questioned—as instance the lost dog, the homing pigeon, migratory birds, the spawning salmon and the honey bee.

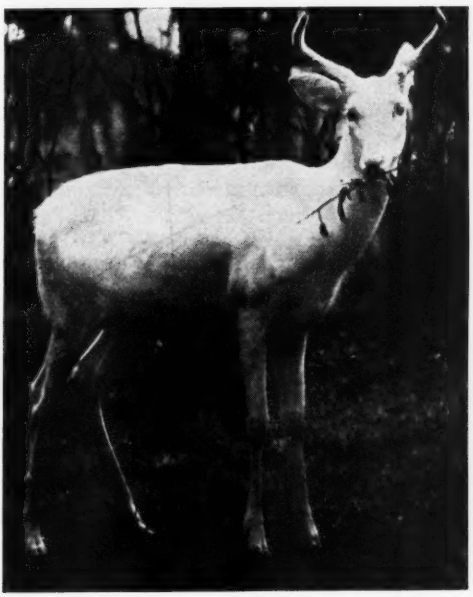
Sterility, regarding the cause of which little is known, is rather common in most wild animals in captivity. Dr. C. B. Penrose in the book, "Diseases in Captive Wild Animals and Birds," states:

There is no apparent rule for sterility. Some families are always sterile in captivity, others are fertile, even with very unfavorable surroundings. The deer, horse, hippopotamuses, pigs, goats, sheep and oxen are good breeders; while antelopes, rhinoceroses, giraffes, elephants are poor breeders. Some members of a family may be good breeders, others poor. The lion and puma breed fairly well; the tiger, leopard and jaguar very poorly.

Both birds and mammals seem to have a strong abhorrence to sickness or injury in one of their kind. This is manifested by the well animals who will either shun the diseased one or proceed to finish it off.

Mink

The complex behavior of animals under varying conditions is, indeed, puzzling to man. Despite the adverse conditions to which wild animals are subjected when captive they show remarkable power of adaptation, something that all life must be capable of to survive.



Albino Buck at the State Game and Fur Farm, Wisconsin Department of Conservation, Poynette, Wis.

Monkeys Like the Winter

A dozen adult Rhesus monkeys and two young spent the past winter outdoors in the City Zoo at Manhattan, Kansas, with little protection against the cold save the thick, hairy coats with which Nature has provided them for the winter, and their straw-bedded stone huts.

Until recently it was thought necessary to keep monkeys in heated houses in winter outside of the tropics. Now they are allowed to play in the snow as shown in the illustration and, surprisingly, the mortality rate is much lower.

It was about freezing when this picture was taken, but the animals played together in the snow, reached eagerly for peanuts, and ate them sitting in the snow.

Three years ago 10 sickly monkeys were put into these cages. Two have died, but the remainder have grown strong and increased their number to 14. That such monkeys, natives of the tropics, can adjust themselves to the cold winters of the Kansas climate has been explained by Herbert Fox,[1] pathologist of the Zoölogical Society of Philadelphia: "The physical condition of the animals and kind of cold (damp or dry) have much to do with the ability to stand low temperatures. Monkeys have passed through very severe winters without damage and subsequently in less severe winters have had frozen fingers, toes, and tails."

The death of the two monkeys was attributed to tuberculosis, with which all the monkeys were affected, but the relatively dry atmosphere of the Kansas winters and the thick, hairy coats enabled the less infected animals to survive and even to thrive in the cold of this climate.

GEORGE G. TANENBAUM

Brooklyn, N. Y.

[1] Fox, Herbert. Diseases in Captive Wild Mammals and Birds.

Amputation of a Monkey's Arm

July 29, 1938, the caretaker of the Independence, Kansas, Zoo brought to the Stephenson Pet Hospital of that city a two-year-old, female, rhesus monkey, weighing 12 pounds. The preceding night a badger, which occupied an adjoining cage, had lacerated severely the skin and muscles of the distal two-thirds of the monkey's right arm. In several places the muscles were torn away from the underlying bone.

Taking into consideration the wishes of the caretaker, an attempt was made to promote healing without resorting to amputation. The area was thoroughly cleaned and wrapped in antiseptic bandages. At this time, the condition of the patient was good and she was apparently in good spirits.

After a period of 48 hours the monkey refused food and was becoming greatly emaciated and depressed. Putrefaction and necrosis had set in. It was evident that amputation was necessary to save the life of the animal.

For anesthesia 2cc of nembutal was given intraperitoneally. The muscles and skin were incised back to where the tissues were healthy. Then the muscles were dissected away from the bone to within about one inch of the proximal end of the humerus. At this point the arm was amputated and the end of the bone smoothed. The muscles were drawn over the stump and sutured with No. 1 chromic catgut to form a pad. The skin was brought together over the muscle pad with metal suture clips.

The stump was then bandaged, the bandage running around the chest and left shoulder to keep it in place. Three days later the bandage and skin sutures were removed. Further healing was uneventful.

The day following the operation the patient started taking food and gained rapidly in condition. In ten days she was returned to the zoo, one-armed, but otherwise in good health.

CLARE C. HAMILTON

Geneseo, Kans.

A Case of Syphiloid in a Cat

AUGUST 12, 1938, at Mountain Grove, Missouri, a white, part-Persian, female cat was observed to have a peculiar skin condition which brought about the death of the animal. The cat was about three years of age, and had had three litters of kittens, which were normal in all respects. She had the reputation of being a very good mouser. For a period of about one month the cat had been scratching at its abdomen. Flea powder had been used without giving any relief. About three weeks after the scratching was first noticed, the cat retreated into the wood-shed and refused to come out for food or drink.

Clinical Symptoms.—When observed two hours before death, the cat was emaciated and weak, the mucous membranes were a dull pink color, temperature was 100.4°F., pulse 160 and weak, respirations 52 and shallow. The abdomen as far forward as the umbilicus and the medial surface of the thighs were hairless. Sharply delimited, hypertrophic plaques, varying in size from one-quarter to three-quarters of an inch in diameter, were present in the perianal and perivulvar regions, on the medial surface of the thighs, and on the abdomen. These areas were round to oval in shape. The skin showed evidence of scratching, and the scratching was continued up to the time of death. The hypertrophic areas were brownish in color, moist, and cool to the touch. The rest of the skin appeared to be normal.

Post-Mortem Findings.—On post-mortem examination, the skin lesions were found to be the prominent feature of the malady. The small intestines were practically empty. The mucous lining of the stomach and first part of the small intestines showed focal areas of redness. Two tapeworms (*Echinococcus granulosus*) were found in the small intestines. The skin lesions on section (hematoxylin-eosin stain) showed primarily an infiltration with eosinophiles; only a few neutrophiles and mononuclears were present. The lymph glands of the hind legs were noticeably enlarged, and on section showed eosinophiles, a few giant cells, and fibroblasts.

Diagnosis.—Syphiloid. This rather unusual condition was first described under the name "Dermite Lymphadenique" by Thibierge and Leblois[1] in 1924. A. Henry and Louis Bory[2] in 1934 applied the name syphiloid of cats to it. The condition is characterized by smooth, moist plaques, sharply delimited and usually of an oval form, resembling the hypertrophic mucous plaques of syphilis in man. These are noticeable particularly in the perianal and perivulvar regions. They also occur in the peribuccal region, on the abdomen, and on the medial aspect of the hind legs. There is a marked reaction of the draining lymphatics with adenopathy. Usually the popliteal lymph glands are much enlarged. Scratching of the lesions indicates that they are pruritic. In prolonged cases emaciation occurs.

The causative agent of the disease is unknown, although an acid-fast bacillus has been described by one observer. Diagnosis is difficult except histologically. Spontaneous recovery is said to occur occasionally. One theory as to the method of transmission is that the causative agent—a virus or bacterium—is carried by rats.

Histologically, the normal tissue is replaced by granulomatous tissue. Most of the infiltrating cells are leucocytes and eosinophiles. Epithelioid cells and mononuclear cells are also present. Some of the lesions are almost entirely made up of eosinophiles. In the enlarged lymph glands, cells similar to those found in Hodgkin's disease are found.

In other words, although the lesions of this disease are clinically similar to syphilis in man (hence the name syphiloid),

histologically they resemble Hodgkin's disease or the leucemias.

Acknowledgement.—Helpful advice and assistance were given me in the preparation of this article by Drs. T. B. Hall and H. Schaerrer.

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A. A. DAVIES

Kansas City, Mo.

Temporary Paralysis of the Diaphragm In a Dog

October 17, 1938, a large, four-year-old, male coonhound (commonly called a red bone) was presented to the veterinary clinic of Kansas State College for treatment of injuries after having been hit by an automobile.

Examination revealed that besides an oblique fracture in the middle third of the shaft of the right femur, the animal was showing symptoms of labored and very irregular breathing, along with a temperature of 102°F. and respirations of 50 per minute. The inspiratory and expiratory movements were more rapid and of greater depth than those found in the normal animal. Careful observation revealed exaggerated movements of both the abdominal and the intercostal muscles. When pressure was applied to the ventral surface of the abdomen, many of the symptoms were relieved, which led to a tentative diagnosis of rupture of the diaphragm.

The fractured femur was immediately placed in a modified Thomas splint, and the diaphragmatic condition was given careful consideration. No definite diagnosis being reached, the following day a laparotomy was performed to determine the factor responsible for the embarrassed condition of the respiratory system. The diaphragm was found to be intact, disproving the tentative diagnosis; it was, however, completely relaxed, and the musculature was lacking in tone. On inspiration the diaphragm ballooned out into the abdominal cavity, seeming to be incapable of contraction. Since no therapy was indicated for this condition, its developments were merely observed during the healing of the fractured femur.

No change in the diaphragmatic condition was noticed until the third day following the laparotomy, when it was noted that respiration was not so deep and labored as it had been, and that the exaggerated movements of the musculature of the abdominal and costal regions were not so pronounced. Gradual improvement took place, and in a week the breathing was completely normal. With the exception of the fractured femur, from which the splint could not be removed for two weeks, the dog was ready to go home.

Slight injury to or pressure upon the nerves supplying the diaphragm probably caused the respiratory symptoms.

CHARLES D. LABAHN

Sedalia, Mo.

Poisoning in Cats?

A client of mine had five or six cats, with which he had no trouble until shortly after a strange cat came to his place, when they began to show symptoms of weakness, and one or two days later curled up and died. These cats were fully mature, and had been fed all the fresh milk they wanted. My client destroyed the strange cat, waited about three weeks, and then got six more cats. Of course, the new cats were a little shy for about a week, but he got them to drinking milk, and they soon appeared to be all right. One evening he noticed that they were getting weak, just as the others had done, and in two days they were all dead.

If you can give me any information as to what this condition might have been, I would appreciate it. I might add that these cats were not eating rats, but did find a mouse once in a while. There has been no poison put out on this place.—*G. F. T.*, Mo.

Intussusception in a Bitch and Her Puppies

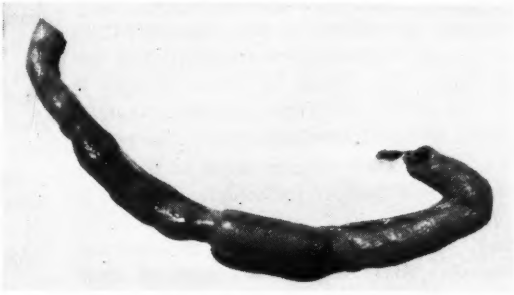
May 9, 1936, Inspiration of White Isle, a bloodhound bitch, died of peritonitis, a sequel of intestinal intussusception and rupture. The invagination was in the upper part of the colon, which had become telescoped for a length of about eight inches, making a total involvement of 24 inches of colon. The cecum was completely everted. Toward the posterior end of the small intestine were two ruptures about eight inches apart.

On operation, the fluid in the peritoneal cavity was found to be muddy colored. The telescoped portion of the colon was pulled out, the rents in the small intestine were sutured, and the cecum was removed; but the bitch died in a few hours.

This bitch had whelped nine puppies April 26, 1936, and seemed practically normal afterward. The first day she did not eat, but the next three days she ate very well. From the fifth day after whelping till her death, nine days later, she ate nothing. She drank copiously and vomited occasionally during this period.

Of the nine puppies she whelped, eight died from intussusception. The first case appeared as a partly prolapsed rectum, protruding about one inch from the anus. This puppy died on the fourth day after birth. The second puppy to die had an intussusception at about the middle of the colon. The gut was gangrenous. One by one, thereafter, the puppies died until the eighth one died on May 12th, three days after the dam. The ninth puppy is now full grown and in good condition. Three of the dead puppies had rectal prolapse; the remainder had intussusception of the colon. No autopsy was held on two of them, but the elongated volvulus could be plainly felt through the abdominal wall. The puppies appeared to die from starvation. When forcibly fed, they usually vomited soon afterwards.

Interesting questions are presented by this case. Are the uterine contractions of labor due to fetal stimuli as commonly believed or are they due to a hormone? Was an excessive amount of this hormone evolved in this case and peristalsis also stimulated? Did the puppies obtain some of this hormone through suckling, or prior to birth, which stimulated undue peristalsis in them also? We have perhaps an analogous phenomenon in the case of witch milk in human infants; where it is presumed the offspring obtains some of the lactogenic hormone of the mother either *in utero* or from the colostrum. Was there so great an excess that it affected the colon of the bitch after the uterus had shrunk toward normal?



Intussusception in a Dog.—*Photo by the author*

On the other hand, several cases of intussusception occurring in unrelated puppies and young dogs at or near the same time have been reported from some kennels, indicating a cause related to the food supply.

LEON F. WHITNEY.

New Haven, Conn.

* * * *

The first public hospital was opened in Philadelphia in 1752; its erection was sponsored by Benjamin Franklin. Three physicians, one of them Thomas Bond, the hospital's founder, gave their skill free of charge during the first few months. New York Hospital was ready for occupancy in 1776. The first medical societies were formed: State Medical Society of New Jersey in 1766, and Delaware State Medical Society in 1776.—*Pharmacal Advance.*

Posterior Paresis (Paraplegia) in Dogs

This clinical entity offers a wide range of diagnostic and prognostic difficulties due to its complex symptoms, uncertain etiology, variations in response to treatment, and the possibility of such complications as cystitis, hypostatic pneumonia, and decubitus. The course of the condition is usually rather prolonged, complete recovery taking as a rule from ten days to two weeks.

The anamnesis usually obtained from the owner in a case of paraplegia is that the dog suddenly lost control over its limbs, finally dragging them, for no apparent reason. There may be a history of traumatic or mechanical injuries. Occasionally a possible cause may be found in the central nervous system and spinal cord in the form of pathological changes brought about by spinal fractures, luxations, hemorrhages, edema, or tumors.

In three cases presented recently to the veterinary clinic of Kansas State College, there was no infectious disease manifested, nor was any injury or spinal fracture observed under the fluoroscope. All three were observed and treated throughout by the author, under the direction and supervision of Dr. E. J. Frick.

Case 1.—A six-year-old, male, German shepherd. The only history was that the paralysis had come on suddenly. The dog had been tied to its quarters over the week-end, so that the possibility of poisoning or traumatic injury was practically eliminated. The paralysis was complete from the shoulders backward, with loss of control over the sphincters of the rectum and bladder. At first the general condition was little affected, but secondary complications (decubitus and hypostatic pneumonia) altered this. After a long-drawn-out course, the dog made a complete recovery.

Case 2.—A six-year-old, female, black cocker spaniel. The clinical symptoms were: locomotor ataxia, paretic appearance of the hind legs, the body being dragged along by the forelegs, hypertrophy due to lack of muscular tonus, loss of control over sphincters of the bladder and lower bowel. This dog made a complete recovery after three weeks of treatment.

Case 3.—A seven-year-old, male Pekingese. This animal did not show such acute symptoms as did cases 1 and 2. It managed to stand up, although swaying considerably. It recovered after eight days of treatment.

Treatment of all three cases consisted chiefly of mechanical evacuation of the bowels by daily enemata of warm water, emptying the bladder by pressure, rest, massage of the legs, and, most of all, good nursing. The diet contained raw or cooked horse meat and milk. Internal medication consisted of sulfanilamide, 7½ gr. per os, and one dram of shark liver oil, with a high content of vitamin A, in a gelatin capsule, once daily.

PETER DE CINQUE

Woodbine, N. J.

Castor Bean Poisoning in the Dog

The castor bean, *Ricinus communis*, of the family Euphorbiaceæ, is a large plant used for decorative purposes in the temperate regions, and for making castor oil for medicinal purposes. The seeds of the plant are about as large as ordinary beans, oval, compressed, obtuse at their extremities, very smooth and shining, and a grayish or ash color. Three of these seeds are usually found in a shiny capsule 12 to 20mm in diameter.

The bean contains an active material, ricin, just under the outer layer. This is a toxic, albuminous substance, soluble in water and insoluble in oils. Ricin is somewhat similar in its properties to the bacterial toxins, since it causes the formation of antibodies in the blood. It has been found experimentally that by gradually increasing the dose, an animal can build up a sufficient number of antibodies to tolerate as much as 400 to 800 times the normal tolerated dose. Ricin can be destroyed by prolonged heating to over 60°C. under moist conditions, but is more resistant to dry heat.

The potency of ricin may be judged from the fact that six beans have been known to produce death in the horse, two in children, and three in man. It is thought by some authorities to be more poisonous than strychnine, prussic acid, or arsenic in the

blood stream, and it is 10 times more irritant than castor oil. The exact toxicity is not known; experiments have shown, however, that a dose equal to one two-millionth of the body weight is fatal to rabbits.

On ingestion of the bean, the acrid substance produces a hyperemic to hemorrhagic inflammation of the gastrointestinal tract. According to some authorities, part of the poison is destroyed by the digestive processes, forming probably ricin oleate of sodium, which has marked irritant properties, but is not poisonous. This is absorbed, and may appear in the milk, imparting purgative properties to this secretion. The rest of the ricin is absorbed, and causes coagulation in the circulation of the gastrointestinal tract. Ulcers may be formed due to the diminished blood supply and the action of the digestive juices on the dead tissues. The symptoms of poisoning as a rule do not appear for several days, or even for weeks after ingestion. The symptoms consist of violent abdominal pain, vomiting, purging, and collapse. Paralysis of the respiratory and vasomotor centers may occur, causing a change in pulse and respirations.

Lesions observed on post-mortem examination are: ulcerative stomatitis and enteritis, swelling of Peyer's patches and the mesenteric lymph glands, diffuse nephritis, internal hemorrhage, and capillary thrombi in the various organs.

A smooth-haired, male fox terrier, four years of age and weighing approximately 25 pounds, was brought to the veterinary clinic of Kansas State College October 23, 1938, with a history of having eaten some castor beans a short time previously.

Examination disclosed temperature 100.3°F., respirations 28, pulse 100. The animal was a little depressed and the conjunctiva somewhat congested, though not markedly so.

Diagnosis: castor bean poisoning. The prognosis was favorable, since early treatment was possible.

The dog was given a low enema of warm water, and then washed out two or three times in order to remove the beans and as much of the irritant substance as possible from the alimentary tract. Further treatment was symptomatic.

On the second day the animal was very much depressed; it did not respond readily to call and would not eat; its vision was impaired, and the eyes had a glassy stare. On the fourth day it was still much depressed; the pulse rate was 180, the temperature was slightly below normal, and a diarrhea was noted, the dejecta consisting of practically pure blood. On the sixth day the general depression was somewhat lessened, and the dog responded to call. It continued to improve until discharged on October 31, at which time it was eating, and apparently normal in all respects.

The treatment consisted of the daily administration of a one-half ounce capsule of metaphen in kaolin, which was given for three days until the bloody diarrhea disappeared. The diet during the period of hospitalization consisted of partly-cooked horse meat and clean, cold water.

Metaphen was used to advantage in this case, but any good intestinal astringent which will coat over and sooth the intestinal tract is suitable. Although it was not used in this case, the intravenous injection of dextrose would probably be of value in correcting the dehydration and loss of basic salts which occur very rapidly in diarrheas, and in furnishing energy to the animal in a usable form.

ELDON F. HAYES

Newton, Kans.

* * * *

Veterinary Practice in Australia

The chief feature of the life of a veterinarian in Australia, outside of the large cities, is the amount of territory covered, according to William Nielsen, Cessnock, New South Wales. Doctor Nielsen is official inspector of five abattoirs, inspecting some 200 beef cattle, 300 sheep and 60 pigs weekly. His horse practice includes two large studs and coal mines, averaging 400 horses. A small part of his practice is devoted to dairy cattle, which require treatment chiefly for milk fever, weed poisoning, and bloat. Doctor Nielsen frequently covers 200 to 300 miles a day over good cement and tar roads. His clientele for veterinary dentistry, of which he does a great deal, extends over a radius of 600 miles; he covers this territory twice a year. His fee for dentistry is a flat rate of $3.50 per animal.

Urinary Calculi in the Dog

Urinary calculi are masses of solid material found in the urinary system. They may be of various sizes and shapes, and may be found in any part of the urinary apparatus. Small calculi, or "sand," may be found in the pelvis of the kidney; larger stones are commonly located in the bladder; more commonly in unspayed bitches than in other dogs. In the male, small calculi lodged behind the os penis and obstructing the urethra are common.

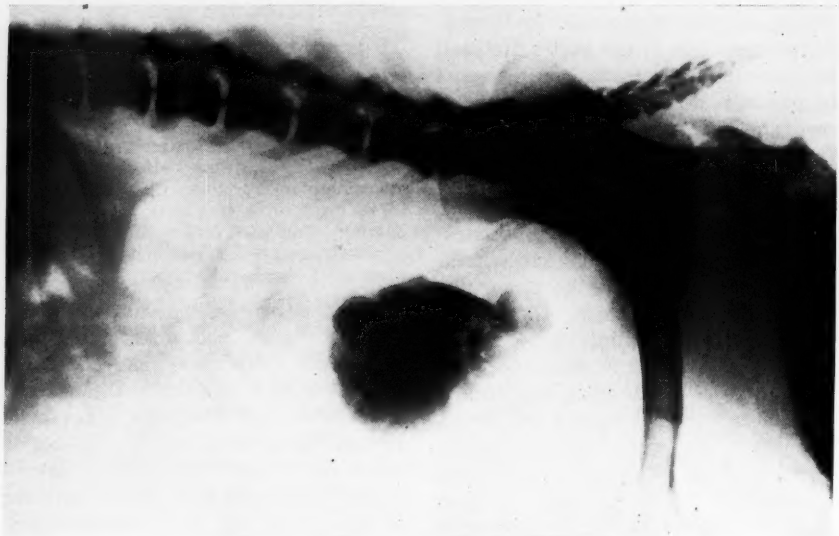


Fig. 1. Radiograph showing the mass of calculi in the bladder.

According to Hawk and Bergiem,[1] calculi are of two different classes: simple and compound. The simple stones are composed of deposits of but one substance and the compound, of several different substances; the reaction of the urine determining in a large measure the substance deposited. Uric acid, urates, and calcium oxalate, are the usual components in acid urine such as is normal in the dog.

Each kind of calculus has, according to Hutyra and Marek,[2] a different causative agent. This may be a change in the body metabolism, a supersaturation of the urine with some salt, or the presence of some foreign substance, such as epithelial cells, casts, blood clots, fibrin, shreds of pus, or necrotic tissue, to act as a nucleus. A constant retention of urine, common in house dogs, is a frequent cause of urinary calculi; since it allows the salts of the urine to settle out, gradually forming the concrements.

Symptoms of urinary calculi are often somewhat obscure until an advanced stage has been reached, when definite symptoms, combined with a history of constant desire to urinate, are seen. There is a decided polyuria, and constant straining without passing urine or its passage in but small amount. There may or may not be pus discharged from the vagina. There may also be a severe hemoglobinuria. In advanced cases the calculi can ordinarily be palpated in the bladder.

In treating urinary calculi, the only method that has proved generally successful is surgical removal. With this procedure, unless the patient is in a very debilitated condition, the prognosis should be favorable.

In the past few months a number of these cases have been treated at the vet-

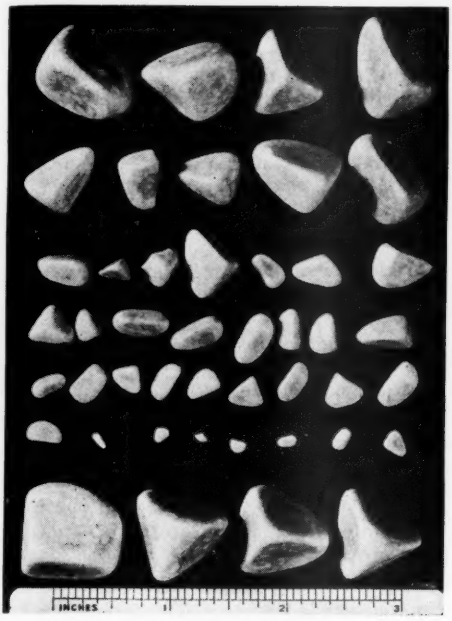


Fig. 2. Some of the largest of the calculi removed. As shown by the scale, some were nearly one inch in diameter.

erinary clinic of Kansas State College, and in each the outcome was entirely satisfactory.

A female scottie, seven years of age, was presented to the clinic October 30, 1938. The history was one of constant urination, with a copious discharge of pus from the vagina. The patient was otherwise in very good physical condition. The temperature was 101.5° F. A foreign object was palpated in the region of the bladder, x-ray pictures (Fig. 1) confirmed the diagnosis of urinary calculi, and surgical removal was resorted to.

The operative area was prepared and the patient anesthetized with ether. An incision was made directly over the bladder in the midline and the organ opened by an incision about one inch long. The stones were removed and the bladder was irrigated to remove the pus. There were 90 calculi grouped in the shape of a ball; some of the largest are shown in Fig. 2. The bladder was closed with a continuous Lembert suture, and the peritoneum, muscle and skin with interrupted sutures. Complete recovery followed.

Another interesting case was that of a female Pekingese, three years of age, with the same history and symptoms except that the temperature was 103.5° F. and she was in very poor physical condition. Upon examination, a urinary calculus was palpated and surgical removal was recommended.

The patient was anesthetized with 1cc nembutal intravenously, and ether. A large stone composed of calcium oxalate was removed. At 6:00 p. m. the temperature was 103° F., and 3cc of neoprontosil was given intravenously. The next morning the temperature was 101.8° F., and the patient ate a little. Ten grains of sulfanilamide was administered per os; and from then on an uneventful recovery was made.

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R. S. Todd, K.S.C. '39
Manhattan, Kans.

"Sweeny" in a Greyhound

November 11, 1938, a nine-month-old, purebred, male greyhound was admitted to the veterinary clinic of Kansas State College, with the history of having suddenly gone lame two months previously while at play. The condition had persisted since that time.

Examination showed the patient to be thin and depressed, with marked paleness of the oral and conjunctival mucous membranes. Dehydration was evidenced by dryness of the oral mucosa and failure of the skin on the back of the neck to retract quickly when lifted up and then released. The feces were black in color, loose in consistency, had a fetid odor, and showed the presence of hookworm eggs on microscopic examination. The temperature was 102°F., the pulse beats 144 per minute, and the respirations 80 per minute.

When walked in a straight line, there was a supporting leg lameness of the left

front leg as evidenced by a slight movement of the shoulder away from the thoracic wall with inward rotation of the scapula when weight was placed on the limb. Examination of the lateral surface of the left shoulder blade showed the scapular spine on that side to be more prominent than the spine of the other scapula. This was apparent because of the marked atrophy of both the supraspinatus and infraspinatus muscles which lie on either side of the spine in the supraspinous and infraspinous fossæ of the scapula, respectively.

A diagnosis of atrophy of both the supraspinatus and infraspinatus muscles together with ancylostomiasis was made and a very guarded prognosis was given.

The main lines of treatment were directed towards improving the general condition of the patient by first getting rid of some of the intestinal parasites and then treating the muscles with irritants, rest, and massage. Accordingly, a capsule containing 2cc of tetrachlorethylene plus 0.2cc of arecoline hydrobromide was administered per os and this was followed in 20 minutes with an enema of warm water. Two cc of Lugol's solution was injected at several points into the affected muscles and the area then massaged with linimentum album for five minutes. The massage treatment was repeated daily, and the only exercise allowed was a 10-minute walk each day.

The patient was discharged from the hospital November 28, 1938, with instruction to the owner to confine the animal in a small pen in order to permit only a limited amount of exercise, and to massage the limb daily with liniment. April 13, 1939, the owner reported that after following the suggested line of treatment, the dog had improved greatly in condition, had fattened considerably, and did not limp. Evidence of the dog's marked recovery is shown in that the owner entered him in the "Spring Sapling" of the National Coursing Association races held at Abilene, Kansas, April 23, 1939.

In his text, "Regional Veterinary Surgery," J. A. W. Dollar states:

Paralysis of the suprascapular nerve in horses occurs rather frequently. The disease in horses is distinguished by lameness when weight is placed upon the limb, as evidenced by abduction of the limb and jerking of the scapula and humerus away from the thorax at the moment when the leg is perpendicular. Atrophy of the paralyzed muscles occurs later and is most marked in the supra- and infraspinatus and two teres muscles. The cause of paralysis of the suprascapular nerve is a violent backward movement of the shoulder or of the leg whereby the nerve is overstretched. It sometimes accompanies hemoglobinuria and rheumatism.

The condition seen in the greyhound closely follows Dollar's description of paralysis of the suprascapular nerve in the horse except for the fact that in this dog there was no marked jerking away of the scapula and humerus from the thoracic wall when weight was placed on the limb. Dr. W. M. McLeod, professor of anatomy and physiology at Kansas State College, believes that the absence of this symptom in the dog is due to the difference in the anatomy of the shoulder region of the dog from that of the horse. It is his opinion that the jerking away of the scapula and humerus in the horse is caused by a paralysis of the posterior superficial pectoral muscle which almost always accompanies "sweeny" in horses. In the horse, this muscle is attached to the ventral edge of the sternum as far back as the sixth cartilage, but in the dog, the superficial pectoral muscle is placed further forward and extends only to the third cartilage of the sternum. Another interesting point, he states, is that the serratus ventralis muscle is attached equally to the anterior and posterior facies serrata on the costal surface of the scapula in the horse. Whereas in the dog, the facies serrata is limited only to the anterior part of the costal surface of the scapula, and the insertion of the serratus ventralis wholly to this area allows this muscle to limit outward movement of the scapula.

With the increased growth in popularity of the sport of greyhound racing, it is surprising that there are not more reports in the literature regarding lameness due to atrophy of the shoulder muscles in dogs.

The only mention the writer has been able to find on this subject is mentioned in "Pathology and Therapeutics of the Diseases of Domestic Animals," by Hutyra and Marek, in which it is stated that Zimmerman recorded a case of paralysis of the suprascapular nerve in combination with paralysis of the anconeus in the dog.

BERNARD ROVNER

Philadelphia, Pa.

Postorbital Abscesses in Dogs

During the past year an increasing number of dogs with sudden swellings of the head just posterior to the orbit, which develop into abscesses in a short time, have been presented for treatment in the small animal clinic at Kansas State College. In the past this condition has occurred only sporadically, but practitioners from North Carolina, Oklahoma, Ohio, Kansas, and Missouri have recently reported increasing numbers of cases.

The condition appears to occur most commonly in the sporting breeds of dogs, or in dogs allowed to run in the woods for exercise. The following is a typical case:

February 25, 1939, a two-year-old, male Dalmatian was presented at the clinic for treatment of a sudden swelling which had developed 24 hours after it had been allowed to exercise in the woods. The swelling was located just posterior to the orbit, causing the left eye to be swollen completely shut, and extending back to the ear. The swollen area was warm and quite painful. The dog's temperature was 101.5°F. Its pulse and respirations were normal, and, aside from the postorbital swelling, the animal appeared to be in perfect physical condition.

An area about two inches square at the lowest part of the swelling was shaved, thoroughly cleaned with alcohol, and painted with tincture of iodine. A sterile needle was inserted through the skin into the abscess, and some of the exudate was collected in sterile test tubes for bacteriological study of the condition. After removal of the needle, the abscess was incised at the lowest point so that drainage could be obtained. The abscess was flushed out with saline solution until only a clear, serous fluid exuded; then an iodine pack was placed in the cavity and held in place by one interrupted suture. This pack was removed 12 hours later, the wound was cleaned thoroughly and painted with 1-1000 hydroalcoholic pyoktanin blue solution, and the dog was sent home. Recovery was complete in eight days.

Bacteriological Findings.—The material collected at the time the abscess was opened was examined bacteriologically, with the following results:

Cultural examination upon blood agar plates revealed two distinct types of colonies. One was identified as *Staphylococcus aureus.* The other was a chromogenic organism producing a distinct red pigment. It was a gram - positive, short, thick rod which failed to ferment sugars. One dog and seven guinea pigs were injected subcutaneously and intraperitoneally with these organisms, no pathogenic effect being noticed. The exudate, when injected in the same manner, also proved to be noninfectious for guinea pigs and dogs.

The patient before treatment.

From this and other similar cases, it appears that the condition can be treated satisfactorily by establishing drainage of the abscess and flushing out the exudate, then packing the cavity with gauze saturated with tincture of iodine. Uneventful recovery usually occurs within 10 days, although two cases have been reported from Oklahoma in which a septicemia caused a fatal termination.

Since the etiology of the disease is still unknown, and it appears to be spreading, it is suggested that practitioners who have the opportunity of observing cases watch for etiologically significant symptoms.

DONALD F. MOSSMAN, K.S.C. '39

Manhattan, Kans.

Surgical Relief for Involvements of the Anal Sacs of Dogs

By JACK KNAPPENBERGER, Hutchinson, Kansas

THE anal sacs of dogs are frequently involved in various types of pathological disturbances which are presented to the small animal practitioner for treatment.

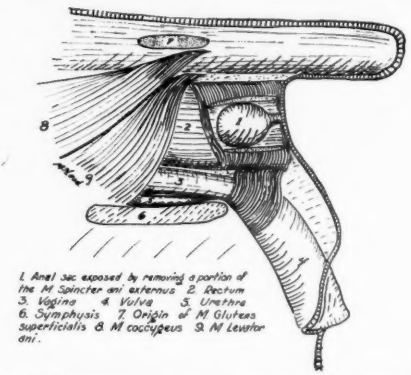
■ In the normal dog (fig. 1), these sacs consist essentially of pouches varying in size from that of a pea in young or small animals to that of a walnut in older or larger dogs. They lie on either side of the rectum between the longitudinal muscle of the rectum and the external anal sphincter muscle. Their secretions are discharged through a small circular opening on either side close to the line of junction of the skin and the mucous membrane of the anus. The lining membrane consists of a stratified epithelium provided with many sebaceous-gland-like alveoli, and coiled glands.

At the time of sexual maturity, they begin secreting a grayish, fatty material of acid reaction and peculiar odor. This material, according to investigators, is a mixture of cast-off epithelial cells from the anal sac lining, and secretions from the coiled glands of the anal sac, both being mixed with large numbers of bacteria which apparently set up a decomposition process, resulting in an odorous, fatty pulp of varying consistency and amount. In normal defecation, the pressure of the external anal sphincter muscle expresses this material through the opening and into the feces.

The normal physiological function of the anal sacs has never been definitely determined. Investigators believe, however, that apparently this secreted material imparts to the feces a characteristic odor specific for each individual which may be attractive to the opposite sex. It also undoubtedly aids in defecation by acting as a lubricative agent.

■ The most common pathological involvements of the anal sacs are as follows:

1. There may be a *simple retention* of the secreted material. This condition is gen-



1. Anal sac exposed by removing a portion of the M. Sphincter ani externus. 2. Rectum. 3. Vagina. 4. Vulva. 5. Urethra. 6. Symphysis. 7. Origin of M. Gluteus superficialis. 8. M. coccygeus. 9. M. Levator ani.

Fig. 1. Diagrammatic representation of the anal sac *in situ*

erally the only involvement which occurs in younger dogs. It causes itching, restlessness, and a scooting of the hind parts on the ground. Relief can be obtained readily by expelling the contents of the sacs by manual manipulation. This is usually a routine procedure in the examination of dogs.

2. Another involvement may be a *change in the character or amount* of the secreted material. In older animals, the secreting lining of the sac often becomes involved due to constipation and introduction of infection or foreign bodies. This results in a change in the type or amount of secretion. Infection causes a purulent secretion which often tends to close the orifice, resulting in retention and swelling. Often there is an increase in the amount of secretion, which is objectionable in that it collects around the margin of the anus.

3. As a sequela to the closing of the natural orifice, *fistulous openings or sinuses* are often formed to the outside. This occurs

when the natural outlet becomes closed and the continued secretions cause increased swelling and pressure, and perforate the overlaying tissues to the outside through which the secretions drain. Injections of mild irritants and curetting are often practiced in an attempt to correct the condition.

4. Various types of *neoplasms* frequently involve the perianal region and the anal sacs. They may originate in the skin immediately adjacent to the anal opening or they may grow from the mucosa of the anus and rectum. Often they involve the sebaceous glands of the region. Benign adenomas and malignant carcinomas or combinations of the two are types most frequently found in old animals, while benign papillomas sometimes occur in younger animals.

Case Report.—A mongrel dog 14 years old and weighing 40 pounds was presented at the veterinary clinic of Kansas State College November 30, 1938.

A lobulated, tumorous mass almost completely surrounded the anal opening. In addition, the left anal sac was discharging a purulent and foul-smelling exudate through a sinus opening to the outside between two of the lobulations.

The tumor consisted of several secondary lobules, the largest being about an inch in diameter. It was situated just dorsal and to the left of the anus and was ulcerated and denuded over a large part of its external surface. Immediately below this largest lobulation were three smaller ones occupying positions on the left and lower left borders of the anal opening. Above and to the right of the anus were two tiny lobulations apparently much younger and less malignant than the rest of the neoplasm.

The condition had been developing for about two years. However, in the last six months, the tumors had increased greatly in size and had become ulcerated and painful. The left anal sac had swollen and had opened to the outside. The dog often licked and bit the mass, showed signs of distress when defecating, and was quite restless and uneasy. The owner stated that it constantly sought comfortable resting positions and that it was never quiet, even at night.

Owing to the age of the patient and the signs of malignancy of the neoplasm, euthanasia was recommended; however, the owner chose surgical removal with a guarded prognosis.

The dog was fed nothing the day preceding the operation and a low enema was given immediately before the anesthetic was administered. Anesthesia was obtained with 9cc of nembutal. The area was cleaned,

shaved and disinfected with tincture of metaphen.

As the tumor involved the anal area on three sides, it was deemed inadvisable to try to remove all of it in one operation. Therefore, the two tiny lobulations above and to the right of the anus were left for removal at a later date.

A crescent-shaped section including all the lobulations above, below, and to the left of the anus was carefully removed. The inner or concave border of this section followed rather closely the margin of the anus, and the outer or convex border was made through the healthy skin lateral to the lobulations. The incisions were carried in deep enough to remove the necrotic remains of the left anal sac.

During the removal of the tumorous mass, hemorrhage was controlled by the use of hemostats, while postoperative hemorrhage was checked by means of a sterile gauze tampon held in place in the crescent-shaped cavity by means of interrupted sutures through the skin bordering the cavity. The tampon and sutures were removed after 48 hours, and the area treated as an open wound. Recovery was complete in three weeks and all symptoms of restlessness and pain had disappeared.

Upon microscopical examination, the tumor was found to be an adenocarcinoma. Although signs of malignancy were definitely present, they were not extensive.

Several other cases of similar character have been treated with favorable results. All occurred in old dogs and recovery was complete in each case.

Tracheal Anastomosis in the Dog

Recently a case was brought up for discussion which merits mention, not because of the spectacular results obtained, but because it demonstrates the value of conscientious surgery of the creative type and the results obtained through persistent treatment.

Early in November, Drs. W. E. Dickey and Marion C. Alson of the Carthage Veterinary Hospital, Carthage, Mo., received an English setter bitch three years of age with the history of having been attacked on the previous day by two German shepherd dogs. Numerous lacerations were found on various parts of the body, the most serious of which appeared to be a long tear in the skin in the region of the collar on the ventral side of the neck. Upon further examination the tear was found to have gone through the muscles of the region and severed the second and third tracheal rings below the larynx. There was considerable tissue destruction and accompanying edema and inflammation in the surrounding area. Aside from a slight dyspnea, the animal breathing through the tracheal wound, there were no noticeable deleterious effects.

The treatment decided upon was that for an open wound. The wound was cleaned, an antiseptic applied, and the area stimulated with an allantoin solution. Whether due to the fact that the allantoin solution was not stimulating enough, or that breathing through the wound prevented complete healing, a permanent fistula was set up in a small area ventral to the larynx through which the animal continued to breathe. At the end of three weeks the wound was again examined and it was found that the tracheal rings had failed to fuse. As all tissue response had been utilized it was obvious further progress toward recovery could not be expected.

The idea of healing as an open wound was abandoned, and a radical operation, removing the injured tracheal rings and joining the two normal portions of the trachea, was decided upon. The animal was anesthetized with 7cc of nembutal intravenously and restrained in dorsal recumbency. The operating table was tilted so as to lower the anterior portion of the body. A longitudinal incision was made through the skin and muscle on the ventral aspect of the neck, including the permanent fistula and cicatricial tissue, and the affected portion of the trachea exposed. The area embraced in the operation is shown in the accompanying diagram (fig. 1). The affected portion of the trachea was dissected away from the surrounding tissue, all bleeding vessels being ligated. The trachea was elevated to prevent aspiration of fluids. The second and

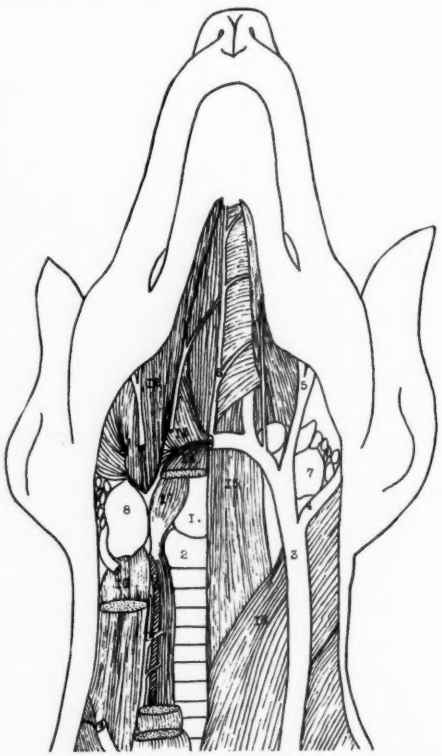


Fig. 1.—1. Thyroid cartilage. 2. Trachea. 3. External jugular. 4. Internal maxillary vein. 5. External maxillary vein. 6. Lingual vein. 7. Lymph glands. 8. Submaxillary lymph glands. 9. Common carotid. 10. M. Sternacephalicus. 11. 1st cervical nerve. 12. M. Digastricus. 13. M. Hyoglossus. 14. M. Sternohyoideus. 15. M. Sternohyoideus (removed). 16. M. Sternacephalicus.

third tracheal rings were removed by a transverse incision encircling the trachea. All blood and fluids were removed from the trachea during the operation by constant sponging with cotton pledgets. After all hemorrhage was carefully controlled,

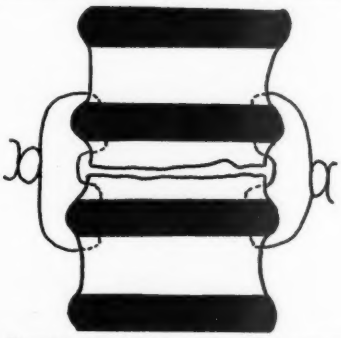


Fig. 2. Showing the placing of the silver-wire sutures

the ends of the trachea were approximated and four interrupted, silver-wire sutures were placed around the circumference of the trachea in a manner similar to that shown in fig. 2. To bring the normal ends into closer approximation, four interrupted, catgut sutures were placed in the tissue between the tracheal rings at varying intervals between the silver-wire sutures. The area was then cleaned and the incision, except an area at the bottom end which was left for drainage and in which a gauze seton was placed, was closed by interrupted, linen sutures.

Following the operation the animal lost its power to bark and a severe dyspnea set in, the animal breathing through its nose, a condition which at the time was feared to be permanent. The wound was stimulated alternately with tincture of iodine, scarlet red solution, and allantoin. Healing took place quite regularly except for a small fistula which persisted for several weeks, but healed upon freshening the wound edges. Following complete healing the dyspnea disappeared, the animal regained its ability to bark and again breathed normally. At no time during the treatment did the animal show any loss of flesh or decline in condition.

R. E. VOLLMAR, K.S.C. '39.
Manhattan, Kans.

Nerve Damage in Chorea

A black, female, cocker spaniel, nine months of age, was presented at the veterinary clinic of Kansas State College March 8, 1939.

No history was available except that the animal had been showing nervous symptoms which were gradually becoming more severe.

The temperature, pulse, and respirations over a period of three days were normal. The dog showed twitching of the muscles of the abdomen and head at approximately 10-second intervals. These later became more marked and occurred at shorter intervals.

The case was diagnosed clinically as chorea, an unfavorable prognosis given, and euthanasia recommended.

The dog was examined carefully to determine the muscles primarily involved. The rectus abdominis, obliquus abdominis externus, and the obliquus abdominis internus appeared to contract to the greatest extent.

The dog was given 3.1cc of nembutal in the radial vein. Even after complete anesthesia the spasmodic muscular contractions continued with similar rhythm, but with slightly less severity. After complete bleeding from the right carotid artery the dog was preserved by injecting a 10% formalin solution into the same artery.

The involved muscles with their primary nerve supply (the first and second lumbar nerves) were dissected out. No macroscopic changes were found. These nerves were traced to their origin from the spinal cord and a three-inch section of spinal cord was removed with the nerves intact. Cross sections of the spinal cord at the points of emergence of these nerves were taken for the microscopic study, together with sections of each part of the brain and sections of the muscles involved.

These sections were prepared by the regular hemotoxylin-eosin staining methods, cover slips mounted, and pathological changes studied. The microscopic changes in the nerve tissues were as follows:

Cerebellum.—Marked changes were noted in the staining characteristics. Abnormally-staining neurons were intermingled with other, normal-staining cells. The most

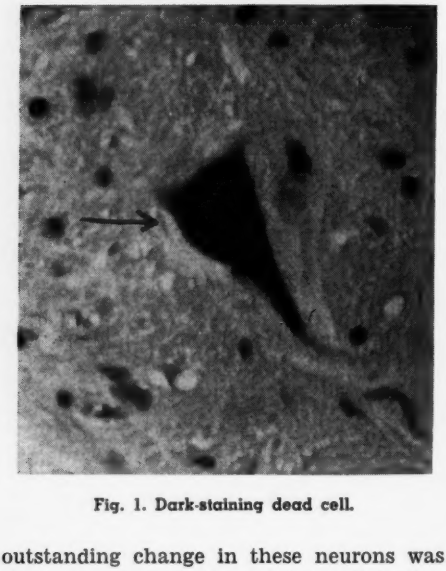


Fig. 1. Dark-staining dead cell.

outstanding change in these neurons was their very dark, basic-staining cell bodies, with no differentiation of the parts of the cells possible (fig. 1). Other cells showed extreme vacuolization of the protoplasm of the cell, and even disappearance of all nuclear structure except the nucleolus (fig. 2). Some of the Purkinje's cells were similarly affected.

Pons.—Changes similar to those in the cerebellum were seen, with an even greater number of very dark-staining cells.

Cerebrum.—Similar changes, but milder, were seen in this part of the brain.

Sections of the spinal cord.—No microscopic changes were noted in these sections or in the sections of the muscles.

Conclusions.—Referring to Volume 1, chapter 4, of "Cytology and Cellular Pathology of the Nervous System" by Max Bielchowsky; degenerated nerve changes shown by vacuolization are acute changes. They are found in serious acute general diseases, especially in infectious diseases and severe intoxications. The very dark-stained cells indicate a chronic cell degeneration. Whether analogies should be drawn from such human neurological studies is, however, questionable. To us these findings indicate a definite central nerve cell involvement at various stages of degenera-

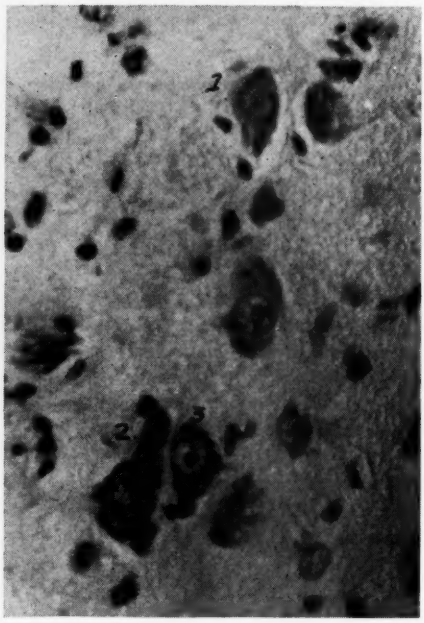


Fig. 2. Neurons in various stages of degeneration.

tion. This tends to emphasize the general clinical observation that the treatment of well-developed cases of so-called chorea of dogs is a futile procedure.

P. H. VARDIMAN AND
J. P. DENTON, K.S.C. '39
Manhattan, Kans.

* * * *

Some dogs become sensitized to fleas, that is, are allergic to them, and some of the large, moist, eczematous areas seem to be due to this reaction. It is easy to rid a dog of fleas, but difficult to keep it free of them. We are prone to underestimate the damage that fleas do to the skin of dogs. Derris powder is probably the best flea repellent.—*C. L. McGinnis.*

Abstracts

Periodic Ophthalmia in the Horse

Examination of 50 horses with periodic ophthalmia did not reveal the presence of any pathogenic organism, but in every case the thyroid glands were abnormal.[46] The weight of the glands varied between 18 and 39gm, the follicular epithelium was flattened, and the follicles were filled with a compact colloid material containing numerous, pigmented, cornified flakes. This suggested that the animals were affected with a thyroid deficiency. Thyroid treatment was given to 38 horses showing the acute form of the disease, and in 36 of these animals no signs of the disease were present a year later. It is concluded that periodic ophthalmia is primarily a constitutional disease which does not appear unless there is a disturbance of thyroid function.

* * * *

Abortion in Sheep

Sheep abortion is common in Schleswig-Holstein. Behrens[62] could find no species of bacteria in aborted fetuses to which the condition might be attributed. He made estimations of the albumin:globulin ratio on 68 blood samples from five different sheep farms, on which abortion was prevalent, as part of an inquiry to ascertain whether dietetic error might be involved; it was abnormal in 44 and "doubtful" in four. There was degeneration of the heart muscle of aborted fetuses.

The author believed that the condition was due to defective nutrition of the sheep during gestation; in central and east Holstein the available fodder is poor in quality and lacking in vitamins, and on the west coast the ewes during the last few weeks of pregnancy are allowed to graze in cabbage fields.

[46]Tagliavini, A., 1938. Ueber die rezidivierende Uveitis des Pferdes (Periodic Ophthalmia in the Horse). *Arch. wiss. prakt. Tierheilk.* 73:66-70. Abst. in *The Vet. Bul.* by J. A. Nicholson.

[62]Behrens, H., 1937. Untersuchungen über seuchenhaftes Verlammen in Schleswig-Holstein. Inaug. Diss., Hanover. Abst. in *The Vet. Bul.*

Rouget in Sheep

The chief form of the disease in sheep is polyarthritis, and it is pointed out that the name "rouget" is incorrect, as no erythema is observed in affected sheep.[61] The history of appearance of cases in various countries is traced. The organism is stated to have lost much of its virulence for pigs after passages through sheep. A somewhat detailed description is given of the form of disease produced by *Erysipelothrix rhusiopathiæ* in horses, oxen, sheep, pigs, birds, rodents and human beings.

Infection of sheep is considered by the author to be *via* the umbilicus from infected soil. Methods of immunization and prevention are discussed.

* * * *

Non-Sweating in Horses

Attention is drawn to the fact that little of value is known about "non-sweating" or "dry coat" in horses, and Stewart[58] hopes that this description of his experiences with the condition and his ideas on it may be of some use to future investigators.

The incidence, common symptoms, and treatment of the disease are discussed, followed by a description of lesions found post mortem. Stewart then suggests that the condition is due to chronic arsenical poisoning, and sets out his reasons for such a hypothesis, all based on his knowledge of the symptoms and lesions of the disease, and of the habit of those in charge of many racing stables in India of giving arsenic in large doses to their horses.

* * * *

Milk Control in Germany

Existing legislation in Germany has not provided for adequate veterinary control over the milk supply, except in the case of certain special grades of milk, and much untreated, infected raw milk is sold to the consumer.[63] Over large areas there is as

[61]Caudron, M. F., 1936. Le Rouget du Mouton. Thesis, Alfort. Abst. in *The Vet. Bul.* by H. B.

[58]Stewart, C. M., 1938. Non-Sweating in Horses. *Jnl. Roy. Army Vet. Cor.* 9:161-170. Abst. in *The Vet.. Bul.* by F. J. Andrews.

[63]Ehrlich, C., 1938. Tierarzt und Milchwirtschaft. *Dtsch. Tierarztebl.*, 5:2-6. Abst. in *The Vet. Bul.* by D. H. Willson.

yet no pasteurization. The author emphasizes the need for a system of strict and universal veterinary supervision of milk-production, the final aim being to prevent the entry into the market of any raw milk that does not come from herds entirely free from contagious abortion and tuberculosis.

The opposition to veterinary supervision from milk-producers who regard it as a nuisance and as a financial burden should be met by fixing statutory hygienic requirements with which the producer can easily comply, and by making the State responsible for the cost of supervision.

* * * *

Retention Cysts in Dogs

Retention cysts occur exclusively in the sublingual and submaxillary glands.[64] The two principal forms are the ranula proper and the cervical cyst. Therapy consists in extirpation of the (salivary) gland.

The field of operation lies in the upper neck region where the two maxillary veins enter the jugular vein. On compressing the jugular vein the blood is dammed up above the compression, bringing into relief a vascular triangle, formed by the junction of the maxillary and jugular veins, and located ventrally from the parotid gland. In this triangular region is situated the submaxillary gland; on its cranial pole is joined the sublingual gland. A large area, extending into the intermaxillary space as far as the cyst protrudes, is shaved. The field of operation is now cleaned and disinfected, and the skin and the cutaneous muscle are severed vertically to a length of six to eight cm. The resulting bleeding is of little importance; the bleeding vessels are clamped with a Halstedt forceps; at the close of the operation, the bleeding will have ceased. Next, the connective tissue is dissected from the vessels. Medially from these vessels a tough, fibrous capsule is seen; it is the capsule of the submaxillary gland. When this capsule is incised and pulled open, a yellowish, wax-like, firm nodule, characterized by a distinct lobulation, is brought into view. This gland is easily enucleated without cutting, but particular attention must be paid to the vessels supplying the gland from the medial side. The gland must be pulled out with care in order not to tear the vessels, else they retract and are then difficult to locate for ligation. While the gland is pulled out slowly, the vessels become taut and may be ligated. On the cranial end of this gland, and connected with it by fibrous tissue, is the sublingual gland. It is dissected free in the direction toward the intermaxillary space. It is then carefully lifted out and severed at its anterior end. Usually this causes arterial bleeding, which, however, is of little consequence. The actual cyst capsule now becomes visible in the field. The cyst itself may be left untouched; the contents will then be absorbed; or preferably, after the gland extirpation, the cyst may be slit open at its lowest point, drained and irrigated with a solution of potassium permanganate. The cyst wall is then to be swabbed with tincture of iodine. Healing should be completed in two to four weeks.

After the two glands have been taken out, the wound is tamponed and sutured, except for an opening in the ventral corner of the wound.

* * * *

Canine Blacktongue and the Vitamin B Complex

Typical oral symptoms of blacktongue occurred in four dogs fed on a basal ration complete except for B vitamins but supplemented by a vitamin B_1 concentrate, while control dogs receiving the same ration with 6% autoclaved yeast added, remained healthy.[47] These results confirm those of Birch, György, and Harris, and so far there is little question that blacktongue involves in its etiology a lack of some water-soluble dietary factor or factors found in the so-called vitamin B complex and distinct from vitamins B (B_1) and G (B_2). [NOTE.—This factor has since been determined to be nicotinic acid.]

[64] Berge, E., 1938. Retention cysts of the salivary glands of dogs. (Transl. title.) *Wiener Tierärztl. Monatsschr.* 25:19, 585-598.

[47] Street, H. R., 1937. Production of Canine Blacktongue on Purified Diets. Proc. Soc. Exp. Biol. 36:602-603. Abst. in *The Vet. Bul.* by R. Allcroft.

A New Fly Repellent

The steam-distilled oil of the plant *Tagetes minima* has strong repellent properties for blowflies and is suitable for use in a blowfly dressing[57]. Carbon tetrachloride and tetrachlorethylene are excellent larvicides for use against blowfly maggots, but tetrachlorethylene is irritating on wounds. Both these drugs are distinctly more effective than benzene. Emulsions of the abovementioned substances are suitable as blowfly dressings, and woolgrease is the most satisfactory emulsifier.

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Leucosis in Domestic Animals

Leucosis consists of a tumor-like proliferation of blood-cell-forming tissue.[59] Depending on the degree of maturity of the cells, the leucoses are classified as myelosis, lymphadenosis, lymphosarcoma, and basal cell leucosis. Leucosis is observed among all species of domestic animals. The aleucemic forms predominate; cattle are most frequently subject to it. Bovine leucosis occurs in practically all European and foreign countries, but in mountainous regions the disease is rare. During the past few years leucosis has been on the increase steadily, in Germany as well as in other countries.

Etiologically there is little support for the theory of infection, as regards cattle. Nevertheless, the possibility of a living or a non-living contagion cannot be excluded entirely. The lesions caused by chronic protein intoxication exhibit so much similarity with bovine leucosis that one must reckon with an etiological agent of a similar nature. At any rate, the disease agent is present in the blood serum and in the lesions of the lymph-nodes of affected animals. The rôle which is played by management, feeding, individual disposition, heredity, and other factors, in bringing on the disease, is not known, nor has it been investigated. Bovine leucosis affects usually mature cattle, when they are about five to eight years old, but occurs also in calves. Females appear to be more often affected than males. As a rule the course of the disease is chronic, and depends on a number of accessory factors. The symptoms of leucosis differ much, and depend upon the size and seat of the lesions, and the enlargement of the organ. Leucosis of the skin is rare.

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Tonsillitis in Animals

The following types of tonsillitis are most common[60]: (1) Catarrhal tonsillitis. The tonsils are superficially inflamed, moderately swollen, diffusely reddened; occasionally the vessels on the surface of the tonsils are injected. These cases are observed very frequently; they do not cause visible illness, and they do not cause an angina. (2) Follicular tonsillitis. The inflammation often starts from the former ailment. The secondary nodules begin to swell. The tonsils are often considerably enlarged. The surface is usually intensely reddened and granular. These inflamed tonsils cause difficulty in swallowing, and often produce an angina. The color of the swollen follicles is a light yellowish-red, giving the surface of the tonsils a marbled appearance. The secondary nodules are apt to disintegrate, causing ulcer and pus formation in the sinus tonsillaris. Bleeding of the tonsils is not uncommon. (3) Phlegmonous tonsillitis. The tonsils are highly edematous and considerably swollen. The inflammation spreads to the peritonsillar tissue, to the mucous fold of the arcus pharyngopalatinus, to the velum palatinum, and to the larynx. In addition to the difficulty in swallowing the respiration is disturbed, resulting in snoring sounds. Abscess formation is rare.

The course of these three forms of tonsillitis is from one to three weeks. Often acute tonsillitis does not terminate in complete recovery, but results in a chronic condition. The tonsils are then permanently reddened, and moderately swollen.

[57] Mönnig, H. O., 1936. A New Fly Repellent and a Blowfly Dressing. Preliminary Report. *Onderstepoort Jnl. Vet. Sci.* 7:419-430. Abst. in *The Vet. Bul.*

[59] Seifried, O., 1939. Leucosis in domestic animals. Transl. title.) *Tierärztl. Rundschau* 45:2, 26-30; 3, 43-45.

[60] Gratzl, E., 1939. Angina in domestic animals. (Transl. title.) *Tierärztl. Rundschau* 45:3; 45-50.

Prevention of Coccidia in Chickens

To prevent infection with coccidia when rearing chickens, Nieschulz[65] makes use of a cage made of eternite. The inside walls and the bottom are covered with a cotton cloth. A wire gauze is laid over the cotton cloth on the floor. The ceiling is of glass. The wire gauze and cloth are changed daily, and sterilized. Food and food dishes likewise are sterilized daily. For heating purposes a filament lamp of five to eight candle power is placed in the cage.

Vaccination Against Salmonelloses

From a study of the literature and from his own investigations van Dorssen[66] concludes that in preventive vaccination against Salmonella infections in animals subcutaneous inoculation should be preferred to the peroral inoculation, which proved unsuccessful. The value of the subcutaneous inoculation should not be overestimated either. Principally, it exercises a favorable influence upon the course of the disease; but subcutaneously vaccinated animals may become carriers of Salmonella. Hygienic measures should, therefore, not be neglected when combating the disease.

Ascariasis in Pigs

The complete development of *Ascaris lumbricoides* of the pig and of man can be accomplished in young pigs by means of repeated infestations with the eggs of the worm.[67] A vitamin A-deficient ration does not favor the development of the parasite. The development from ripe egg to the sexually mature worm takes about two months. The resistance of pigs toward infestation rests upon natural as well as acquired properties. An age resistance has been observed, but it is of minor importance. The acquired resistance depends upon the presence of mature worms. Angle worms are of considerable importance in the occurrence of ascariasis.

Etiology of Colic in Horses

Gratzl observes[69] that while gas colics, obstipation, and dilatation of the stomach in horses may be caused by dietary errors alone, these errors are not the sole or primary cause of colic. Likewise, the influence of exposure to cold, and of mechanical causes upon the origin of catarrhal intestinal spasm, and upon volvulus, has been exaggerated. The author is of the opinion that metereological disturbances prior to changes in weather, such as thunderstorms, cloudbursts, cyclones, etc., are the real cause of outbreaks of colic, while dietetic errors, mechanical causes, exposure to cold, and anatomical and physiological handicaps are merely of secondary importance. In the treatment drastic drugs have to be avoided, but antispasmodic remedies are indicated and recommended.

Treatment of Spontaneous Canine Distemper with Sulfanilamide

Treatment was given on the grounds that in distemper superimposed infection is more fatal than virus infection, and that in many fatal cases streptococci are the prevailing organisms present.[73]

Sulfanilamide was given per os in doses of 0.33gm thrice daily, followed by subcutaneous injection of 100cc of a 1% solution in saline, with 5-10% glucose when necessary, twice daily. Prontosil was given twice daily in intramuscular doses of 1cc of a 5% solution per kg body weight. Treatment was given when nasal discharge was observed and continued until it ceased, this period varying from three to 18 days. Relapses occurred when treatment was discontinued before nasal discharge had ceased.

Of 17 animals treated, 16 recovered, while only two out of 20 controls recovered.

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[65] Nieschulz, O. Rearing Chickens Free from Coccidia. (Transl. title.) *Tijdschr. v. Diergeneesk.* 62:11.

[66] Dorssen, C. A. van. The Value of Preventive Vaccination against Salmonelloses. (Transl. title.) *Tijdschr. v. Diergeneesk,* 63.21.

[67] Boer, E. de. Experimental Investigations Concerning *Ascaris Lumbricoides* of Man and of Pig, (Transl. title.) *Zeitschr. f. Inf.-krkh. etc. d. Haustiere* 48:248-269.

[69] Gratzl, E. 1939. *Tierärztl. Rundschau* 45(11):207-213.

[73] Marcus, P. M., and H. Necheles, 1938. *Proc. Soc. Exp. Biol., N. Y.,* 38:385-387. Abst. in *The Vet. Bul.* 9:6, p. 425, by W. J. Ironside.

Book Reviews

HOBDAY'S SURGICAL DISEASES OF THE DOG AND CAT. *Edited by James McCunn,* M.R.C.V.S., M.R.C.S., L.R.C.P., Professor of Veterinary Anatomy, Royal Veterinary College, London. 4th Edition. Cloth bound. 395 pages; 311 illustrations. The Williams & Wilkins Company, Baltimore, 1939.

The first edition of "Hobday's Surgical Diseases of the Dog and Cat" appeared 39 years ago. It and succeeding editions in 1905 and 1924 may be said without exaggeration to have put this branch of veterinary medicine into its proper scientific sphere. The work enjoyed a very large distribution and although out of print and unobtainable of recent years it has retained its popularity.

The present edition has been extensively revised to bring the work up to date and include modern advancements in surgical procedures on small animals, particularly in the field of anesthesia and in radiography. Many new illustrations, a considerable number drawings by the author, add to the attractiveness and usefulness of the work. No veterinarian doing any considerable amount of pet-animal practice should neglect to acquire it.

The volume is divided into 24 chapters, the headings of which indicate the scope of the work and are as follows: General Rules for Treatment of the Patient Before and After a Surgical Operation; Antiseptic Preparation of Instruments, Drainage Tubes, Suture Material, Sponges, etc.; Methods of Securing; The Administration of Anesthetics, Local and General; Accidental and Operation Wounds, Contusions; Inflammation, Ulcer, Abscess, Serous Effusion, Hematoma, Cysts, Sinus, Fistula, Polypus, Gangrene, Bedsores, Burns and Scalds; Tumour, Inflammatory New Growth, Granuloma; The Ear; The Skull; Face, Lips and Nostrils; The Eye and Its Appendages; The Mouth, Pharynx, Tongue and Teeth; The Throat and Neck; The Thoracic and Abdominal Wall; The Stomach and Intestines; The Rectum and Anal Region; The Omentum, Liver, Spleen and Pancreas; Hernia; The Urinary Organs; The Male Generative Organs; The Female Generative Organs; Difficult Parturition (Dystocia); The Locomotor System; Value of the Röntgen Rays in Diagnosis; Radium in Veterinary Practice.

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POISONOUS PLANTS OF THE UNITED STATES. *By Walter Conrad Muenscher,* Professor of Botany, New York State College of Agriculture at Cornell University. Cloth bound. 266 pages, 75 illustrations. The MacMillan Company, New York, 1939. $3.50 .

This little volume includes a description of all vascular plants in the United States that are known to cause poisoning in man or animals by ingestion, by contact or by mechanical injury. The arrangement of the text is by families of plants. The work is intended for live-stock owners, veterinarians, toxicologists and botanists.

The work throughout is condensed and concise. The descriptions of plants are brief, and the symptoms due to their poisonous effects are likewise meager. However, many drawings of the more important poisonous plants are included and these, together with information as to the habitat, the season at which poisoning is most apt to occur and the distribution will in most instances enable the veterinarian to reach at least a tentative conclusion as to the plant responsible for the trouble in a given case of poisoning.

Treatment for the various plant poisoning is given only exceptionally. The literature references, however, are very complete, and thus the practitioner who has available a good library or will go to the trouble to get the many experiment station bulletins on plant poisoning from which additional information as to symptoms and treatment may be had will find this work a most useful quick aid to the study of the subject. Perhaps the field of plant poisoning as it concerns the veterinarian is now too vast to be completely discussed in a single work and we shall have to be content with works such as this that little more than point the way to the varied sources of more comprehensive treatment of the subject.

Professor Sir Frederick T. G. Hobday, F. R. C. V. S.

June 24, Sir Frederick Hobday, London, died after a short illness from a heart involvement. Sir Frederick, who had just passed three score and ten, was one of the most widely known and most famous veterinarians in the whole world. Qualifying (M. R. C. V. S.) in 1892, he was for a time house surgeon in his alma mater, the Royal Veterinary College of London and following that, professor of materia medica and therapeutics. He later engaged in general practice as a junior partner in one of the largest veterinary practices in London or elsewhere; eventually succeeding to the ownership of the practice when his partner died at the age of 94.

F. T. G. Hobday

In 1927 he returned to the Royal Veterinary College as principal. The housing of the college at that time was described as a "national disgrace" and certainly the buildings were the most dilapidated of those occupied by any educational institution in the world. With enormous energy and an ingenuity that has rarely been equaled in raising funds, Principal Hobday set about the collection of a fund for rebuilding the college. His success was remarkable. At a later date we shall describe the new buildings at more length and show some illustrations of them. Suffice to say for the present that except that the building program is not yet quite complete (the surgical unit for large animals is yet to be built) no veterinary educational institution anywhere has finer buildings. As the center of veterinary education in the British Empire they are a monument to a remarkable achievement of Sir Frederick.

Sir Frederick Hobday was a major in the Royal Veterinary Corps during the World War, serving first in France and later in Italy, where he commanded a veterinary general hospital.

Professor Hobday's contributions to veterinary literature were large. In 1900 his work on "Surgical Diseases of the Dog and Cat" was published. The fourth edition of this work is reviewed in this issue. It placed surgery of small animals on a scientific plane. Other works include "Castration of Cryptorchids" (1903), "Castration and Ovariotomy" (1914), "Anesthesia of Animals" (1915), Anatomy and Physiology of the Dog (1921; with F. H. Stainton). He published a revised edition of Courtenay's "Veterinary Medicine" in 1902, and another in 1913. For many years, he has been editor of *The Veterinary Journal*, London.

His consulting surgical practice was large. Long ago he discussed the "roaring" operation out of an experience in operating upon 4,000 cases. His most recent contribution to veterinary literature is a new book, "Fifty Years a Veterinary Surgeon," which will be reviewed in an early issue of this magazine.

Sir Frederick attended the A. V. M. A. meeting held in Toronto in 1911, and operated upon a number of cases at the clinic. He was the recipient of many honors, including Doctor of Medicine from the University of Zurich, a Fellowship in the Royal Society of Edinburgh, Companion of the High Order of St. Michael and St. George, honorary membership in the A. V. M. A. and many others. He participated in the 13th International Veterinary Congress at Switzerland last summer. At that time he had but recently returned from India, where he had participated in an Empire conference, discussing public health aspects of veterinary medicine.

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I have never seen a failure in the treatment of demodetic mange in dogs with canex. Three or four weekly treatments are all that are required in most cases. Demodetic mange is easily diagnosed. It is necessary only to find the mites. If you don't find the mite it isn't demodex.—*C. L. McGinnis.*

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Small ticks on dogs can be killed with a plentiful application of strong derris or pyrethrum powder; but the large ones are too tough and must be picked off.—*C. L. McGinnis.*